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The DENTAL DIGEST

NOVEMBER, 1936
Vol. 42 No. 11

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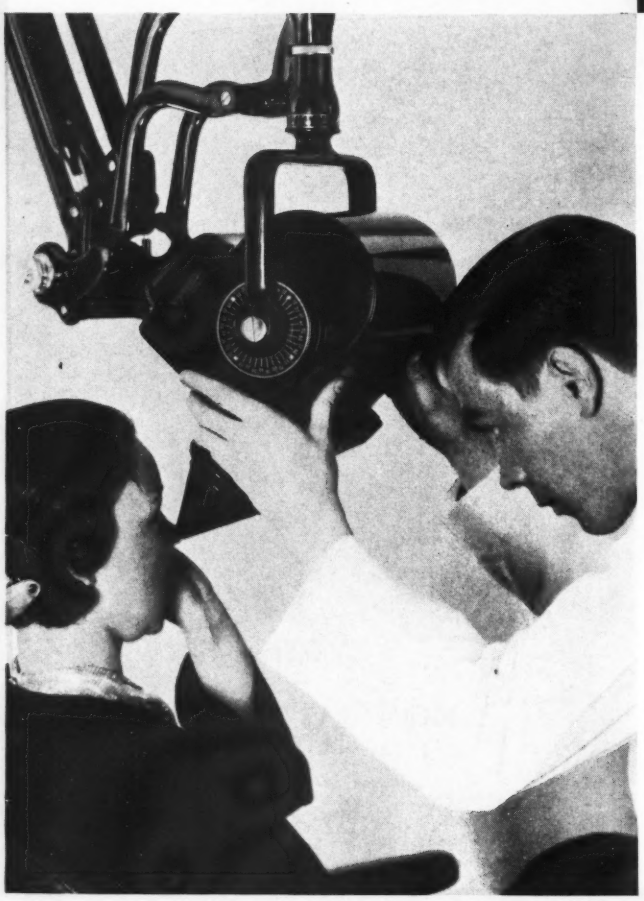

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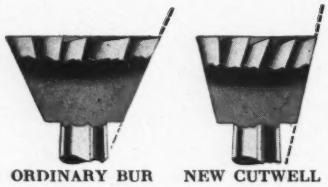

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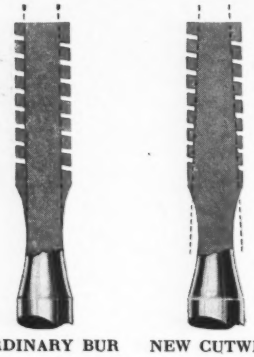

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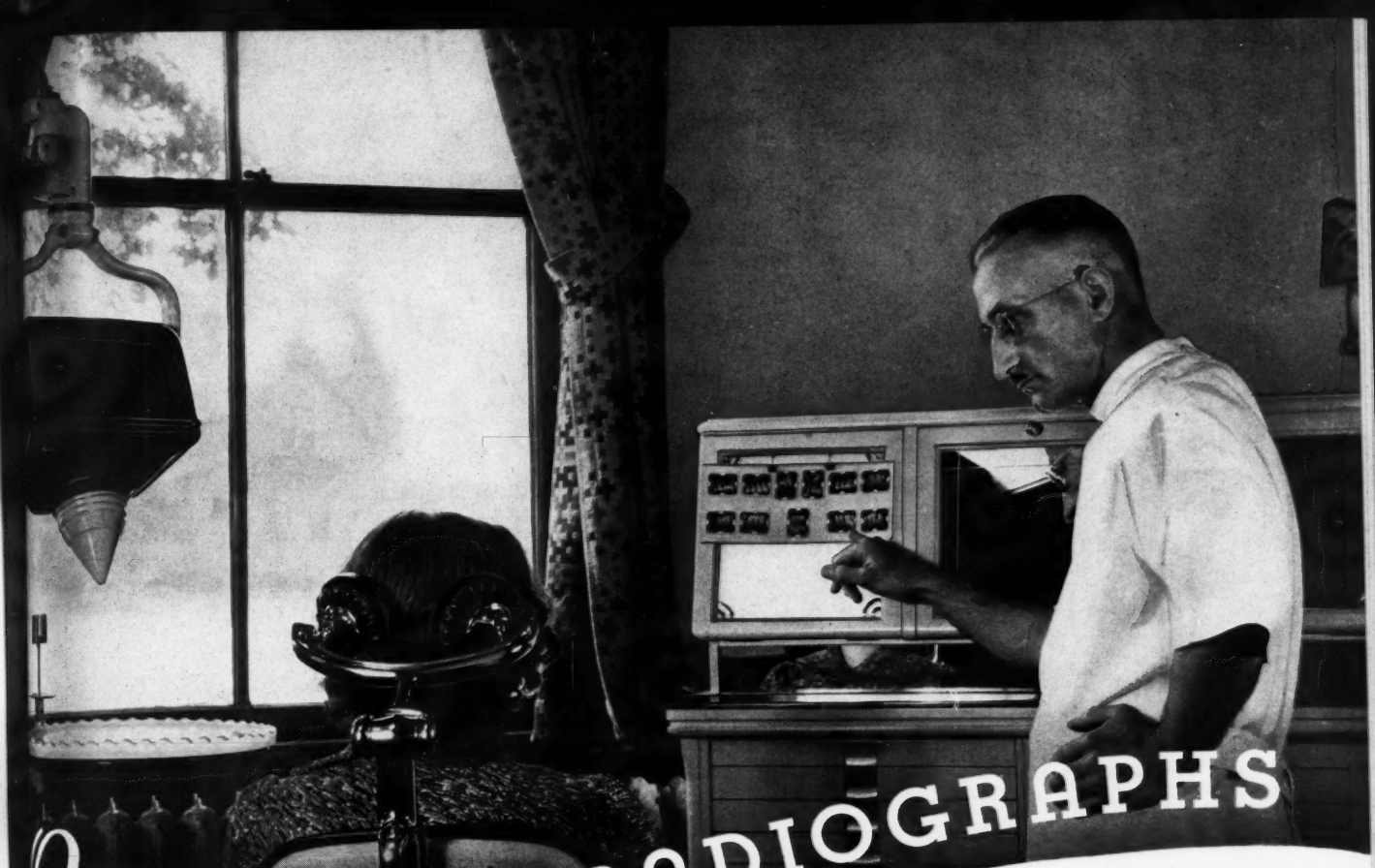

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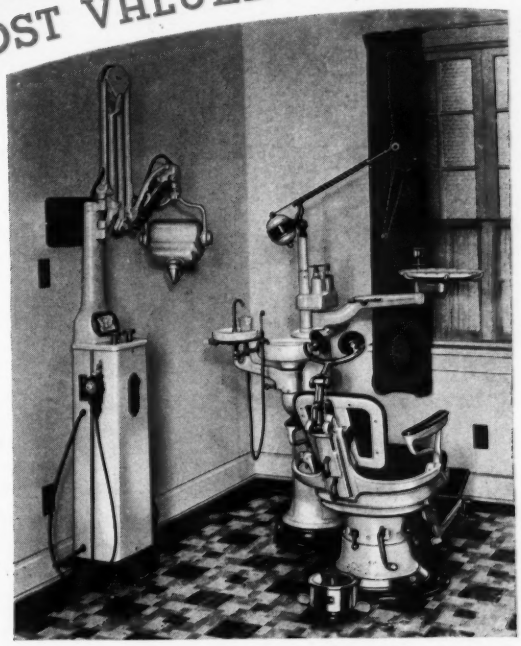

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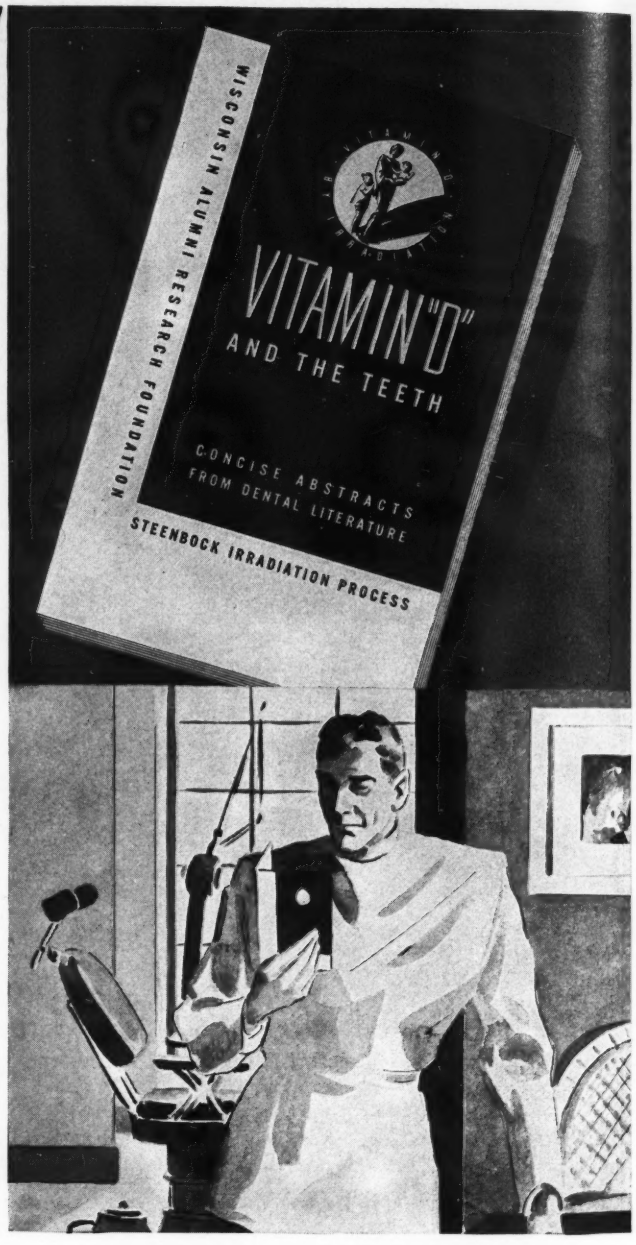

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EDWARD J. RYAN, B. S., D. D. S., Editor
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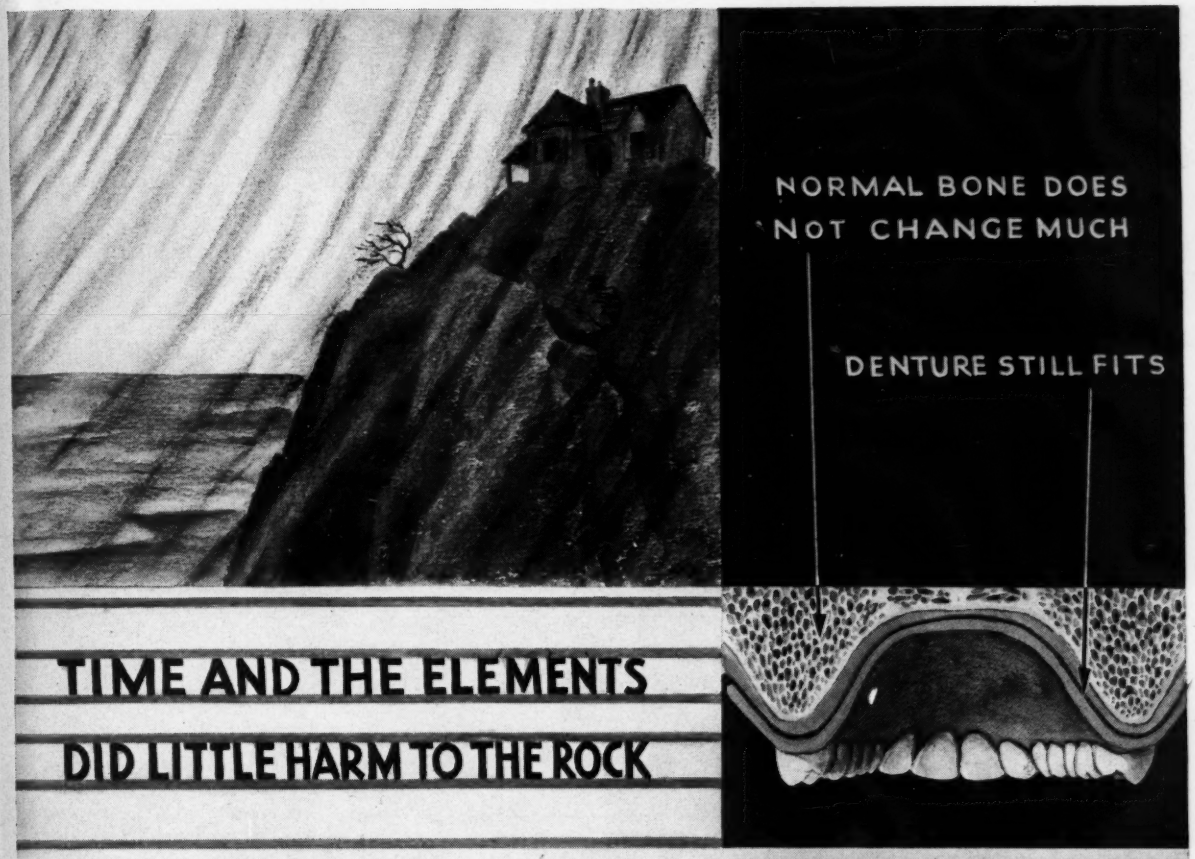
THE EDUCATION OF THE DENTAL PATIENT

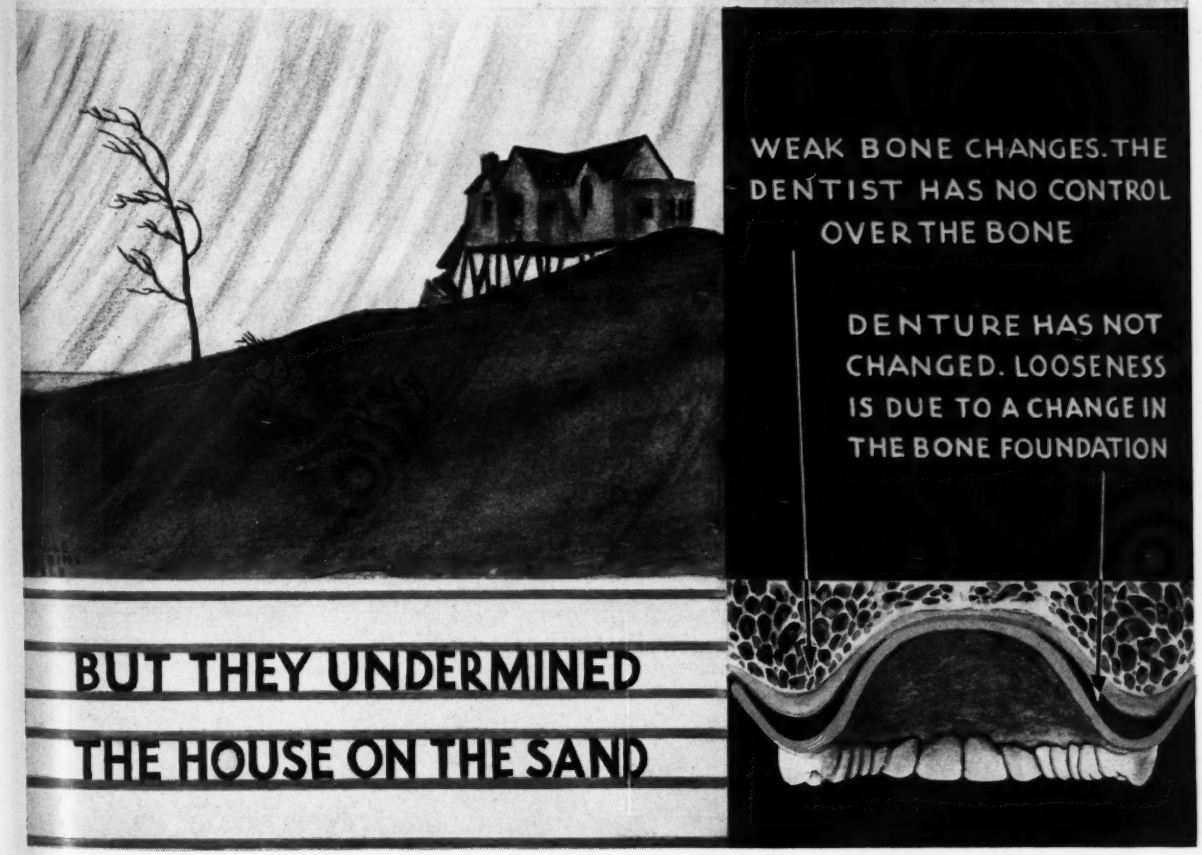
VII. The Foundation's The Thing

NORMAL, WELL CALCIFIED BONE
DENTURE MADE TO FIT SNUGLY
ONE MAN BUILT A HOUSE ON SOLID ROCK
BONE WEAKENED BY LOCAL DISEASE (PYORRHEA) OR GENERAL DISEASE
THIS DENTURE ALSO MADE TO FIT SNUGLY
AND ANOTHER BUILT UPON THE SHIFTING SAND

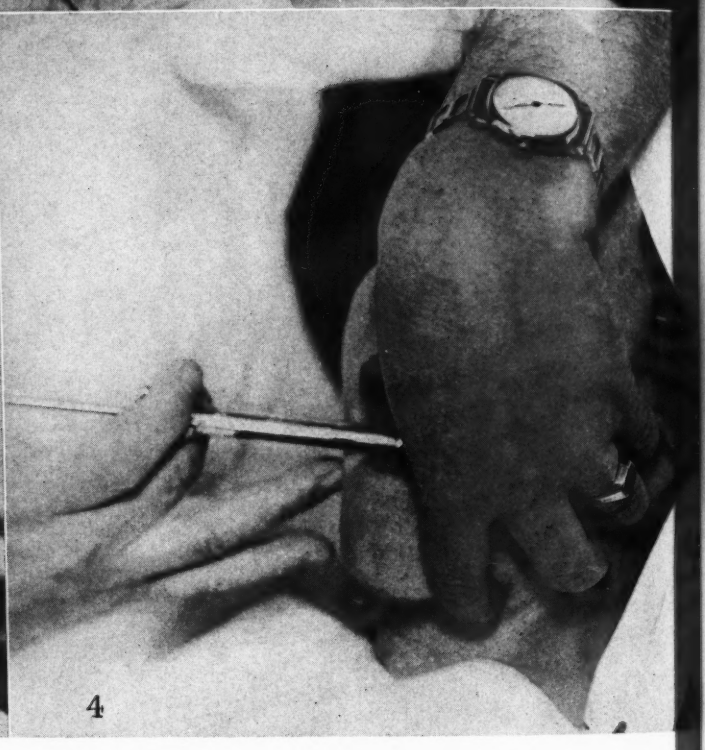
*This is the seventh chart in the third series intended for the use of the dentist in explaining important normal and pathologic dental conditions to his patients. The first and second series have been published in booklet form.



TIME AND THE ELEMENTS DID LITTLE HARM TO THE ROCK


WEAK BONE CHANGES. THE DENTIST HAS NO CONTROL OVER THE BONE
DENTURE HAS NOT CHANGED. LOOSENESS IS DUE TO A CHANGE IN THE BONE FOUNDATION

BUT THEY UNDERMINED THE HOUSE ON THE SAND



A NEW TECHNIQUE FOR MANDIBULAR BLOCK

LLOYD D. IDLEMAN, D.D.S.
Salem, Oregon

FOR mandibular block injections, it has always been the accepted practice to use the index finger of the left hand to palpate the retromolar triangle in locating the point for needle insertion. This method has many disadvantages, the most important of which are: (1) lack of control of the patient's head, resulting in a displaced or broken needle; (2) the lack of a means of measuring the width of the ramus; (3) the inability to create sufficient pressure to make insertion of the needle easy and painless.

Use of Thumb

In order to overcome these faults, instead of using the index finger of the left hand, I use the thumb. For a right mandibular injection, the operator stands slightly in front of the patient, with the patient's head turned to the right just enough so that he looks straight at the operator; the thumb is placed in position over the retromolar triangle (Fig. 1) while the palm of the hand and fingers grasp the jaw and cheek as shown in Fig. 2. The distance between the

(*Continued on page* 387)

Fig. 1—Thumb in position over retromolar triangle for right mandibular injection.

Fig. 2—Palm of hand and fingers grasping jaw and cheek for right mandibular injection.

Fig. 3—Thumb in position to palpate left retromolar triangle.

Fig. 4—Hand grasping jaw and cheek for left mandibular injection.

CERAMICS AS AN AID IN ADULT ORTHODONTIA

S. HARRINGTON STEIN, B.A., D.D.S.
New York

IN CASES of adult orthodontia the problem is often one of esthetics rather than occlusion. In fact the occlusion in this type of case is often good, but the esthetics is poor. This is due to a disharmony in size between the jaw and the teeth—either a large jaw with small teeth or a small jaw with large teeth.

Fig. 1 shows an intra-oral view of an adult's mouth (age 23) in which a large jaw combined with small teeth produce a poor esthetic effect. The space between the two upper centrals is fully 5 mm. A study of the casts, however, shows the patient's occlusion to be excellent (Fig. 2).

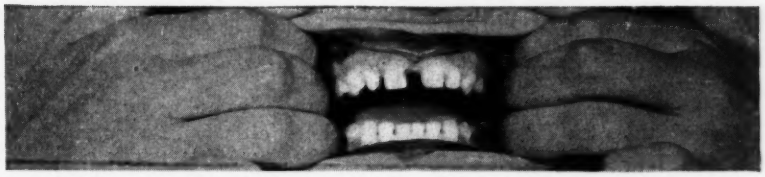


Fig. 1—Intra-oral view showing small teeth and large jaw (age 23).

In a case of this type orthodontia alone can accomplish little. If an attempt is made to eliminate the anterior space by moving the centrals mesially, two large spaces will be produced between the centrals and the laterals. Moreover, it is not likely that the centrals can be kept together. This is because of the presence of a powerful *labium frenum* which acts like a spring to drive the centrals distally the moment the appliance-pressure is stopped. An attempt to move both the centrals and laterals mesially would only substitute two spaces for one. Equally futile would be the attempt to move the long-rooted cuspids in conjunction with the anterior teeth. Both cuspids (Fig. 2, A and C) are in excellent occlusion, and any effort to dislodge them from their natural position is doomed to failure. The solution to a problem of this type lies, I believe, in a combination of orthodontic treatment and ceramics.

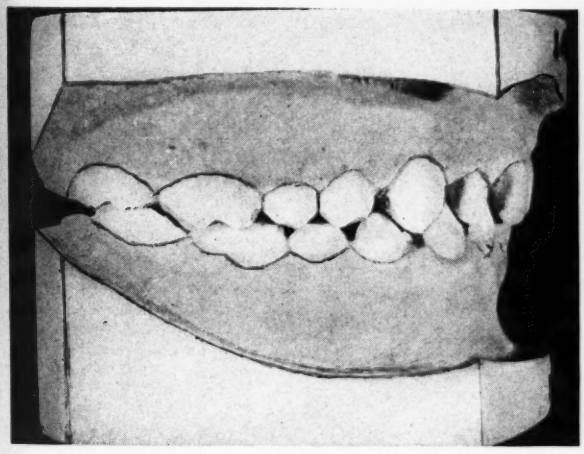


Fig. 2-A

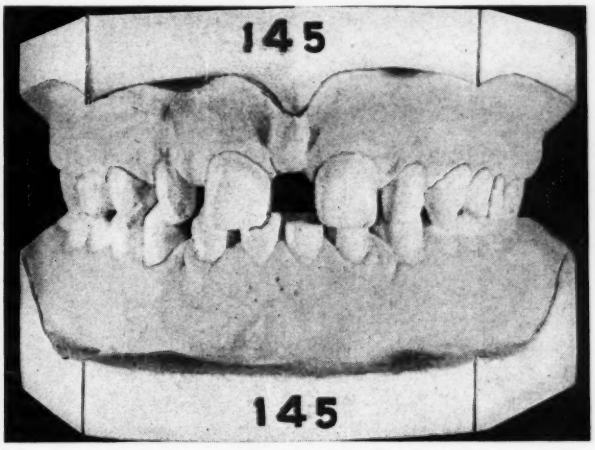


Fig. 2-B

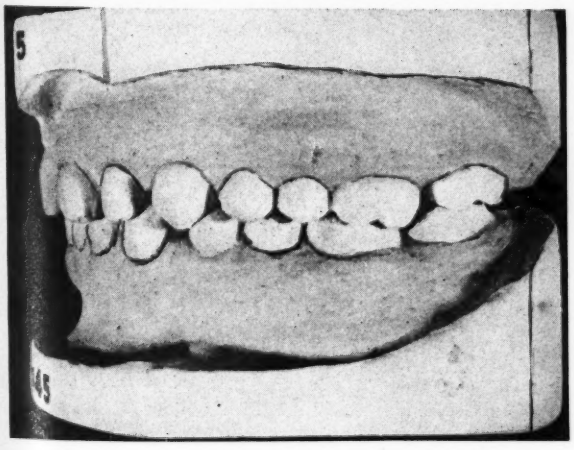


Fig. 2-C

Fig. 2—A, Right view; B, front view (before treatment); C, left view.

Orthodontic Treatment

An upper labial arch-wire (.040) was constructed, fitting into buccal tubes on the first molars. Loop

Fig. 3—Intra-oral view, showing appliance in position.

springs were soldered to the arch-wire to fit on the distal surfaces of the central incisors and the mesial surfaces of the lateral incisors (Fig. 3). The centrals were moved mesially and the laterals distally. To counteract the resistance of the *labium frenum,* bands were placed on the two centrals, and eyelets soldered on the mesio-gingival aspects. Steel ligatures, adjusted once a week, provided additional force to move the centrals mesially. When sufficient room was created between the centrals and laterals to accommodate two additional teeth (Fig. 4), stops were soldered on the labial arch-wire to hold the anterior teeth in position preliminary to doing the ceramic work.

Operative Procedure

When orthodontic treatment was completed the patient was ready for the construction of porcelain bridges. Under a local anesthetic, four porcelain jacket preparations were made on the four anterior teeth. Individual compound impressions were then taken, followed by a sectional plaster impression, to be used in seating the four dies. Before the patient was dismissed a Kryptex crown was placed on each preparation. As an additional precaution for holding the centrals in position a section of a paper clip was bent into a "U" shape, the edges serrated, and the wire cemented into the two central Kryptex crowns (Fig. 5). The laterals were kept in place with the aid of the labial arch-wire.

The next step in the construction of the six-unit-built bridge was to have four soft-metal caps swadged onto the dies. These metal crowns were serrated, fitted on the prepara-

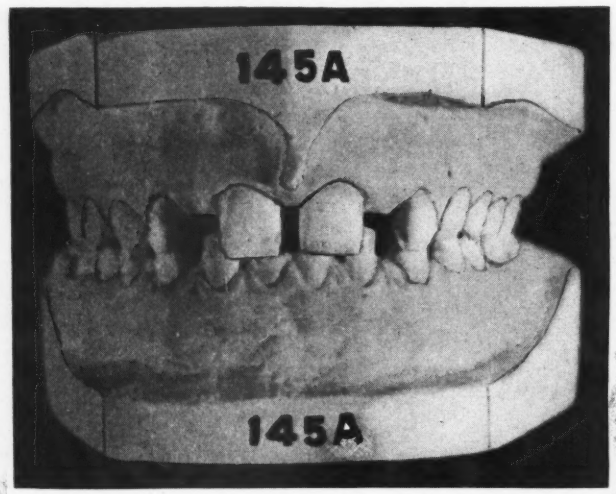


Fig. 4—Note space created for two additional teeth.

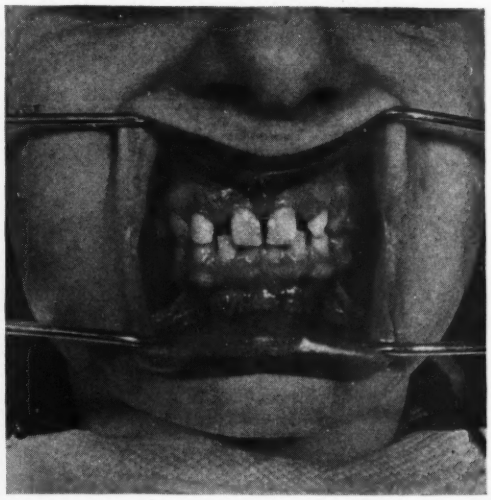


Fig. 5—Showing crowns over preparations; note staple holding centrals in position.

Fig. 6—Intra-oral view of finished case.

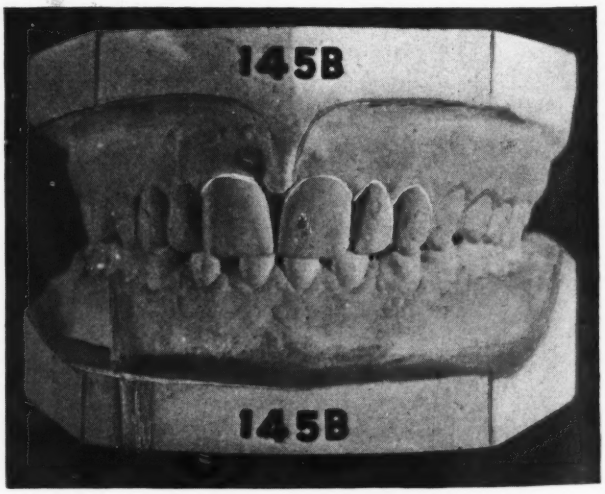


Fig. 7—Model of finished case.

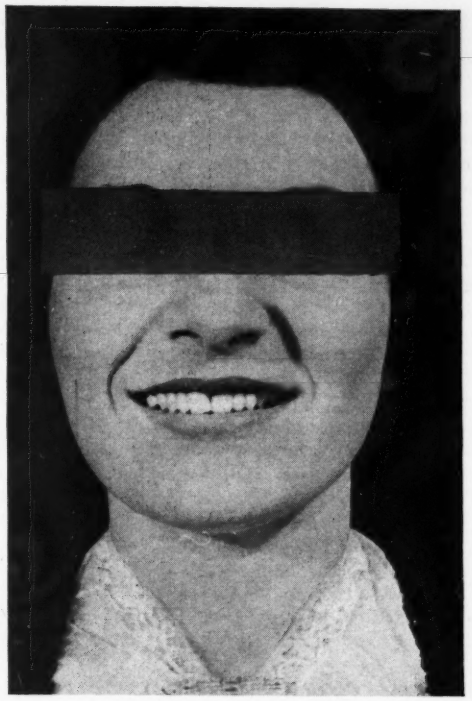


Fig. 8—Finished case.

Fig. 9—A, Intra-oral view of case before treatment; note erosions and restorations in anterior teeth. B, Finished case.

tions, and a plaster impression and bite taken. This additional step aids the laboratory in accurately placing the dies into the plaster impression, which in turn aids in placing the gold copings and pontics that are to carry the porcelain jackets. After fitting the gold copings and pontics, and while waiting for the construction of the porcelain jackets, the same precautions were taken regarding the maintenance of the original position of the anterior teeth as already described (Fig. 5).

The last step in the construction of this rather extensive restoration was to fit the gold copings and jackets at the same time. After the necessary corrections in anatomy and occlusion were made, the gold copings and the attached gold pontics were cemented to place, followed by the insertion of the individual jackets. It should be noted in the photographs of the finished case (Figs. 6, 7, and 8) that the patient's laterals were fitted with cuspid jackets while the patient's own cuspids were ground to look like bicuspids.

In planning the treatment I considered two possibilities: to join the six copings together or simply to join three copings on each side, leaving the central incisors free on their mesial surfaces. I chose the latter procedure because I do not subscribe to the practice of binding many teeth into one fixed restoration. Many six-abutment and eight-abutment fixed bridges show a typical picture of congestion and looseness around the abutment teeth as well as an unhygienic condition underneath the gold saddles. It seems a safe rule to follow to bind as few teeth as possible. In the case described, it was important to provide stability of the central incisors, and that was sufficiently taken care of by tying them to the laterals. Any tendency to labial movement could easily have been checked by relieving the bite.

Improving Esthetics Without Orthodontia

Another class of adult malocclusions that present for correction includes cases of underdeveloped jaws. In their attempt to erupt the teeth have become "jumbled up." Of course these cases can be treated orthodontically, but this usually means extensive widening of the arch, and in some cases distal movement of all the posterior teeth to make room for the crowded anteriors. Sometimes, judicious extraction will provide suf-

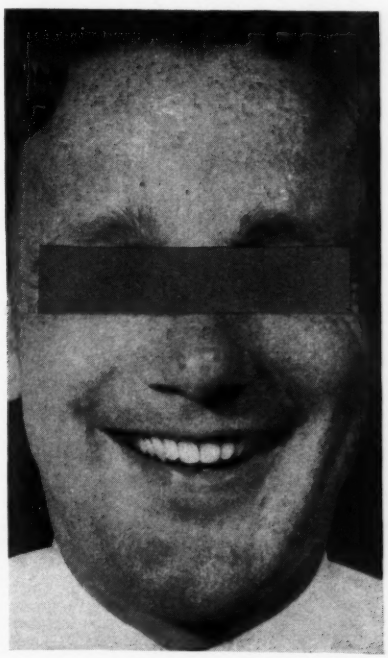


Fig. 10—Extra-oral view of finished case.

ficient room for straightening the remainder of the arch.

In another publication I have given a detailed account of the treatment of an adult malocclusion in which the patient was advised to have the upper first bicuspids extracted.[1]

It is not always possible to adopt any one of these methods, owing to the length of time, expense, or mutilation of the arch. In the case illustrated in Fig. 9, A, the patient (age 32) was unable to undertake expensive and prolonged orthodontic treatment to improve the esthetics of his teeth. In view of the extensive erosion and the numerous restorations in his four anterior teeth, it was decided to cover them with porcelain jackets. Note how the esthetic effect was improved by properly alining the jacket crowns (Fig. 9, B and 10).

Conclusion

The two cases described in this article are typical of many in which patients ask for an improvement in appearance. Most of them can be treated orthodontically; however, there will be some, particularly when the size of the "apical base" (Lundstrom[2]) is out of harmony with the size of the teeth, in which orthodontic treatment can help place the teeth in a favorable position only for ceramic restorations. It was Lundstrom who in 1926, when reporting some of his orthodontic failures, brought out the fact that the treatment of malocclusions must take into consideration the base on which the alveolar process rests. It is not always possible, he pointed out, to "direct the growth of the maxillary and mandibular bases by means of a specific interlocking of the occlusion." Many orthodontists have at one time or another, discovered that the attainment of the ideal occlusion did not necessarily mean that the surrounding regions adapted themselves into harmony with this ideal position of the teeth. That, no doubt, accounts for a good many of our failures. Arches that have been expanded later revert to their original crowded condition, because of a small apical base; and the reverse is also true: teeth spread after they have been brought together, owing to a large apical base.

In still other cases, Figs. 9 and 10 the quickest and best approach is exclusively through porcelain restorations.

[1]Stein, S. H.: Adult Orthodontia, D. Cosmos, 76:611-618 (June) 1934.

509 Madison Avenue.

[2]Lundstrom, A. F.: Some Case Reports and Their Bearing on Diagnosis, Proc. First Internat. Ortho. Cong., page 61, 1926.

TO THE EDITOR

Glossodynia

I WAS interested in your editorial on glossodynia in your August issue because I have done some work in this connection in our medical school where I lecture on dentistry and in our hospital where I am dental consultant.

The following quotation is from a paper I read before our medical society as a part of a symposium on cancer:

"Reference has been made already to the necessity for noting the character of the saliva as well as the amount. Personal observation leads me to believe there is a very definite connection between epitheliomas of some types and lack of mucin in the saliva. Mucin is, of course, the great lubricator and protector; and when its lubricating coat is absent as in some of the anemias, we find the tip of the tongue sore, the incisal of the lower incisors chafing the tongue tip; or again, in leukoplakia, the mucous membrane is changed so that little or no mucus is elaborated, and we have the development of fissures that simulate the cracks in rubber that has lost its elasticity. Frequently, cases of what has been termed 'rubber sore mouth' present to the dentist. The old idea was that coloring matter or impurities in the rubber were the cause, and metal dentures were placed to cure the condition. The cure in these cases was due more to smoothness of the metal, since equal results have been obtained by the use of lubricants on the palatal surface of the vulcanite denture.

"The problem of the promotion of the secretion of mucus is one for the biochmeist . . . .

"Excellent results have been obtained in buccal leukoplakia by the use of pads saturated with liquid petrolatum or vaseline worn in the cheeks at night, with frequent application with the finger of liquid petrolatum during the day.

"It has been noted that patients past forty are more susceptible to carcinoma of the mouth than those younger, and this readily coincides with the lessened mucin content of the saliva. Young patients are usually well supplied.

"The clinical syndrome is as follows in these cases: A tendency to a dryness of the mouth, the saliva being watery and in some extreme cases showing as small islands of froth on the sides of the tongue. Occasionally a metallic taste is noted. The stomach contents are low in acidity. Frequently a diverticulitis is present.

"Caustics and alcoholic mouth washes should be avoided, salines alone being indicated as mouth washes."

I have been getting a high average of good results from the use of a liquid petrolatum. This is used on saturated pads worn in the cheeks. Cotton rolls split open make excellent pads. Results have been good even when the leukoplakia has reached the painful stage.

—H. J. Merkeley, M.D.S.,
Medical Arts Building,
Winnipeg, Canada.

ELECTIVE LOCALIZATION OF BACTERIA IN FOCI OF INFECTION*

OSCAR KARPF, D.D.S.
New York

THE idea that a focal infection in and about the region of the head may be the cause of systemic disease is not new. Focal infection presents one of the most important problems of present day medicine and dentistry. Some writers on focal infection assert that in the books of Hippocrates (460 B.C.) may be found a case report of a patient relieved of rheumatism by the extraction of a diseased tooth. A similar case was reported in the records of Benjamin Rush[1] in 1801, which reads: "I have been made happy by discovering that I have only added to the observations of other physicians in pointing out a connection between the extraction of decayed and diseased teeth and the care of general diseases."

Kaczorowsky in 1885 showed a relation between inflammation of the pulp and other systemic diseases. W. D. Miller[2] in 1890 pointed out the relation between the infections of the mouth and many general constitutional diseases. In 1910, Sir William Hunter gave a lecture before the medical faculty of the University of Montreal on THE RÔLE OF SEPSIS AND ANTISEPSIS IN MEDICINE, in which he observed that oral focal infection is an important factor in systemic diseases. He also maintained that diseased and improperly treated teeth are the port of entry for the most serious diseases.

The modern study of focal infection was begun in 1902 on clinical material by Rush Medical College, in affiliation with the University of Chicago and the Presbyterian Hospital. Frank Billings[3] in 1914, correlated extensive clinical observations with experimental studies in animals, and demonstrated the importance of septic foci as the source of infection when conveyed by the blood or lymph stream. Other prominent workers in this field are Rosenow, Haden, C. H. Mayo, Hartzell, Henrici, and Schottmueller.

*From the University of Illinois College of Dentistry, Senior Thesis.

[1]Duke, W. W.: Oral Sepsis in Its Relation to Systemic Disease, St. Louis, C. V. Mosby Company, 1918.

[2]Miller, W. D.: The Human Mouth as a Focus of Infections, D. Cosmos, 33:869,1891.

[3]Billings, Frank: Focal Infection, J. A. M. A. 63:899, 1914.

DEFINITION

A focus of infection is defined by Billings[4] as a circumscribed area of tissue infected with pathogenic micro-organisms. Infection means the successful invasion of the body or any of its parts by bacteria. A focal infection is a systemic infection that has developed from a focus and continues to receive contributions from it. Foci of infection may be primary or secondary.

Primary Foci of Infection—Primary foci are usually located in tissues communicating with a mucous cutaneous surface anywhere in the body. The more common locations are the teeth, the tonsils, the nasal accessory sinuses, the gallbladder, the appendix, the colon, and the genito-urinary tract.

Secondary Foci of Infection—Secondary foci are infections carried by the blood or lymph channels at some distance from the primary focus. The sites are: lymph nodes in which the infection may persist after the primary focus is removed; and various tissues that become infected as a part of a general or local disease arising from a primary focus.

Acute and Chronic—The focus of infection may be acute or chronic. Acute infections are easy to diagnose inasmuch as the specific result is marked out by a bacteremia or toxemia. In chronic infections, symptoms are not so definite; hence many times the etiology does not point toward any specific micro-organism.

DISEASES RELATED TO FOCAL INFECTION

The following diseases related to focal infection are discussed by Billings:

(a) *Acute*: Acute rheumatic fever; rheumatic endocarditis; myocarditis and pericarditis; chorea; acute systemic gonococcus infections, as gonococcus arthritis, gonococcemia; malignant or ulcerative endocarditis; acute nephritis; acute appendicitis; cholecystitis; erythema nodosum; herpes zoster; spinal myelitis; acute osteomyelitis; thyrositis; iridocyclitis.

(b) *Chronic*: Chronic infectious arthritis; chronic infectious nephritis; chronic cholecystitis; peptic ulcer; chronic infectious endocarditis.

To these Rosenow adds diseases of the central and peripheral nervous system, such as: neuralgia, polyneuritis, encephalitis lethargica, epidemic poliomyelitis.

[4]Billings, Frank: Focal Infection, New York, D. Appleton & Co., 1916, page 4.

ORGANISMS INVOLVED

According to Rosenow and Billings, the streptococcus-pneumococcus group is the most common group of bacteria involved. The following bacteria were found in different lesions: *Streptococcus haemolyticus, Streptococcus viridans* (the most commonly isolated), *Staphylococci aureus* and *albus,* diplococcus, *Streptococcus mucosus,* meningococcus, gonococcus, *Micrococcus catarrhalis, Bacillus influenzae,* Welch's bacillus, *B. tuberculosis, B. subtilis,* B. *fusiformis, B. coli,* diphtheroid organism, *Endameba buccolis.*

THEORIES OF FOCAL INFECTION

The theory of focal infection is usually explained in one of the following ways:

1. *Opportunity or Organ Selective Action*—Karl Meyer[5] believes that the streptococcus is a bacterium of opportunity and that it is the organ or the tissue that decides the selection, rather than a specific property of the micro-organism. He believes that the streptococci are prone to infect areas that have been injured either by diseases or by experimental or accidental trauma.

2. *Anaphylaxis or Protein Sensitization*[6]—This explanation is based on the following theory: Where no growths of bacteria are obtained, it is assumed that the bacteria in the focus elaborate a foreign protein which sensitizes a tissue, producing inflammation without the presence of micro-organisms.

3. *Point of Lowered Resistance*—This explanation assumes that a focus of infection is not a disease-producing agency but acts as a defective point in the defensive mechanism of the body through which the causes of disease enter the body.

[5]Meyer, Karl: The Removal or Retention of Pulpless Teeth, J. A. D. A. 7:185, 1927.

[6]McKenzie, G. M. and Hanger, F. M.: Allergic Reactions, J. Immunol. 13:41, 1927. Derrick, C. L. and Andrews, C. H.: Skin Response of Rabbits to Nonhemolytic Streptococci, Proc. Soc. Exper. Biol. Med. 23:116, 1925.

4. *Elective Localization*—Of the four theories mentioned, E. C. Rosenow's theory of elective localization has received the greatest attention. It has won both strong support and bitter criticism.

The expression *elective localization* was used before Rosenow established his theory. It was understood that certain micro-organisms have an affinity for certain structures, such as the typhoid bacillus for the intestine; the pneumococcus for lungs; the anthrax bacillus for the skin. It was also known that the many exciting causes in metastatic formation present a liking for certain organs; for example: staphylococci for kidneys, streptococci for joints, and pneumococci for the cerebrum.

Rosenow uses the term *elective localization* in another sense. Bacteria from a focus of infection have an affinity for certain organs and they may have a tendency to settle in those organs when they are brought there from the focus by the blood or lymph stream. He defines *elective localization* as organ selection; a characteristic change that certain bacteria of a certain strain undergo. Thus this organ affinity changes in so far as the specific micro-organism reacts differently under different environments. He believes that streptococci taken from patients suffering from diseases, such as cholecystitis or peptic ulcer obtained either from the gallbladder or ulcer or from an infected tooth present in the mouth of such a patient, show an affinity for the specific organs even though the streptococci taken from the tooth have never come in contact with the diseased organ.

In determining localization, circulation is an important factor, but the tissues themselves play an even more important role. It is not definite as yet, whether the lesions in the organ for which a particular strain appears to have elective affinity are due to the lodgment of a larger number of bacteria here than in the other organs, or whether they lodge in equal numbers in various organs but they survive only in the one showing lesions. The evidence points to the first mechanism. It appears that the cells of the tissues for which a given strain shows elective affinity take the bacteria out of the circulation as if by a magnet absorption. This condition tends to disappear quite promptly both on cultivating the streptococci on the artificial medium and on passing them successively through animals, and this may occur without demonstrable changes in morphology, grouping or character of chain formation. Certain bacteria of very low virulence tend to make the soil more favorable. Differences in the host may afford a peculiar type of reaction, or the individual harbors a particular type of focus of infection which is favorable for bacteria to acquire simultaneously affinity for the same tissue, such as the different forms of arthritis may be due to bacteria of different species, each having elective affinity for the particular structures involved.

The tendency to localize electively within a limited range, "monotropism," is the most highly developed in the relatively nonvirulent strains isolated from chronic lesions. In the more virulent strains from acute lesions and after animal passage, this tendency is less highly developed, the lesions occurring over a wider range, "polytropism." The elective property is more highly developed in the streptococci isolated from the organ involved, than in those isolated from the probable focus of infection. Since the bacteria which have grown in a given tissue acquire a greater affinity for this tissue, the likelihood of this bacteria to involve other structures is relatively slight.[7]

This theory of elective localization is closely connected with the variability of the strepto-pneumococcus group. On the basis of his investigations concerning the changing of cocci in experimental endocarditis and myocarditis, Rosenow came to the conclusion that not only does the morphologic differentiation and the virulence of the streptococci play a great rôle in localization, but that the micro-organisms can gain new structure affinities. There is a possibility of transformation of one form of streptococcus into another through the change of culture mediums and oxygen tension. A *Streptococcus hemolyticus* may change to a *Streptococcus viridans* and the latter to a pneumococcus which may change to a *Streptococcus mucosus*.

At present, Rosenow and L. B. Jensen are studying the cataphoretic potential of streptococci which they have proved have the power of elective localization. For example: Streptococci that have elective affinity for joints, as isolated from patients suffering from chronic arthritis, have a mobility of about 10.6 sec. whereas those that tend to localize in the brain, as isolated from patients having encephalitis, have a mobility of about 8.0 sec. Latent life, found most useful in preserving elective localizing power, preserves best the characteristic potentials. Glucose-brain-broth is by far the best medium for preserving the characteristic potential of streptococci. A single transplant in other mediums, often suffices to convert a strain in which originally all organisms were of characteristic potential and had elective localizing power, into one in which the electrical potential is different and in which individual streptococci vary greatly in their charge.

[7]Rosenow, E. C.: Elective Localization of Streptococci, J. A. M. A. 64:1687-1691, 1915.

Results of Studies of Elective Localization

The following selection from a large series of cases of Rosenow's and his supporters' will serve to illustrate results obtained in studies of elective localization of streptococci in and about the teeth, tonsils, and sinuses. These studies have a close relation to the bacteriology and etiology of various diseases.

Acute Appendicitis—Smears from the fibrin along the base of the mesentery taken from a removed appendix show streptococci. Cultures made from pus from pockets in tonsils and infected gums around a badly decayed loose tooth yielded chiefly short-chained streptococci in ascitic-dextrosebroth. An intravenous injection of this culture produced the same type of appendicitis in seven out of eight rabbits.[8]

Ulcer of the Stomach—Ulcer of the stomach and the duodenum in a woman, 62 years of age. The patient had calculus deposits around the teeth and marked gingivitis. She was advised to see a dentist, but did not do so. Several weeks later the patient had an attack, vomited large quantities of blood, ran a high temperature and died. Cultures were made from the blood, lymph gland, liver, duodenal contents, duodenal and gastric ulcers and pus obtained from the infected gums. Cultures from the gums gave a pure culture of short-chained streptococci. These were injected into four animals and three showed ulcers of the stomach. A dog was also injected with the same culture, then chloroformed. The mucous membrane of the pyloric end of the stomach was found studded with numerous and small punctate hemorrhages, and a number of large hemorrhages and four ulcers, near the juncture of the middle and lower thirds of the stomach.[9]

L. J. Hardt[10] followed Rosenow's technique in producing gastric and duodenal ulcers in dogs by injecting them with streptococci isolated by Rosenow from a duodenal ulcer in a child, and also isolated from gastric ulcer in sheep and cows. His results were the same as Rosenow's.

Cholecystitis—Results from experiments over a period of two years in different localities, during different seasons of the year and in different species of animals showed that streptococci and B. *coli* from acute cholecystitis gave rise to marked lesions in the gallbladder of dogs.[11]

R. O. Brown[12] maintains that by making cultures of the emulsified tissues of gallbladders, streptococci are found to be the chief micro-organisms associated with cholecystitis. He also asserts that the direct etiologic relationship of the streptococci is estab-

[8]Rosenow, E. C.: The Pathogenesis of Focal Infection, J. A. D. A. 5:113-124, 1918.
[9]Ibid. pp. 113-124.
[10]Hardt, L. J.: Gastric Juice in Gastric and Duodenal Ulcers, Am. J. Physiol. 40:317, 1916.
[11]Rosenow, E. C.: Cholecystitis Etiology and Gall Stones, J. Infect. Dis. 19:556 1916.
[12]Brown, R. O.: Cholecystitis. Arch. Int. Med. 23:189, 1919.

lished by their presence, by their having elective affinity for the gallbladder of animals, and by the specific agglutinating power of the serum of the patient from whom isolated. The elective affinity for the gallbladder of the strains from the tonsils indicates strongly that cholecystitis is commonly a blood-borne infection from a focal source.

Erythema Nodosum—Erythema nodosum is a specific infectious disease due to a diphtheroid bacillus closely resembling in some stages the streptococcus group. This organism has an elective affinity for the subcutaneous tissues. The infection entrance and the place where the organism acquires the affinity for the skin appears commonly to be in the tonsils and pus pockets about the teeth. The reason for the pain in the cutaneous mode is probably due to the fact that the hemorrhagic infiltration and edema surround a relatively large blood vessel and hence the adjoining nerve trunk.[16]

Herpes Zoster—Herpes zoster involving the left thoracic in a laborer 49 years of age. The tonsils were found cryptic and the teeth were surrounded by gingivitis. Cultures were made from pus from the tonsils, gums and sputum. They all gave streptococcus viridans, micrococcus catarrhalis and staphylococci. Original cultures from the teeth and tonsils were injected intraperitoneally into three guinea-pigs. All developed herpes. One rabbit was injected with the same, and chloroformed the next day. Herpes was found on the tongue, localized edema of the lung, and herpes of the mucous membrane of the trachea.[14]

Myositis—A streptococcus having peculiar properties was isolated from a dead pulp of a left upper first molar, the region where an attack of pain began. The same streptococci were isolated from infiltrated, deep fascias and muscles on the left side of the neck. This streptococcus was proved to have elective affinity for the pulps of teeth, dental nerves and muscles in animals. It was repeatedly isolated from and demonstrated in the experimental lesions in animals, whose blood was sterile. The lesions were again produced on injection, and the streptococci were again isolated. The attack of pain in the face of this patient was due to a streptococcus infection of the sheaths of dental nerves and the pain, swelling, tenderness and spasms of the muscles of the neck were due to myositis and fibrositis—the result of the streptococcus infection.[15]

Chronic Septic Endocarditis—Rosenow gives an account of a series of experiments on rabbits and guinea-pigs; he attempts to prove that there is a localization from cases of chronic infectious endocarditis and of related cocci of the throat and the endocardium. This is due to the presence of fine capillaries in the valves and to the peculiar mode of growth of the cocci. He believes that these cocci are modified pneumococci because growths from single cocci from strains isolated originally from the blood of cases of endocarditis, as well as from throats, when passed through animals, take on cultural pathogenic properties the same as from those of typical pneumococci.[16]

Epidemic Parotitis—A group of streptococci from parotitis injected in Steno's duct produced the characteristic picture of mumps in dogs. Intravenous injections of these organisms produced marked edema and hemorrhage in and surrounding the parotid. The affinity was so great that the streptococci were found in pure culture in three out of five puppies removed from the uterus of a dog, which was chloroformed during a marked parotitis following injection into Steno's duct.[17]

Acute Anterior Poliomyelitis—Results of injections of cultures from tonsils or throats of twenty-two cases and those from the brain and cord in eight cases were studied in detail. The animals injected were: young guinea-pigs, rabbits, kittens, dogs and monkeys. One hundred and twenty-three were injected intravenously with tonsil strains, and forty-eight with brain and cord strains. The streptococcus found in poliomyelitis tends to localize electively in the central nervous system in young guinea-pigs, rabbits, kittens, and less often in adult animals of the same species and in adult monkeys. The symptoms and lesions produced resemble those found in poliomyelitis in man. The results obtained indicate strongly that the streptococcus under consideration is not merely a secondary invader but has an etiologic significance in poliomyelitis.[18]

Arthritis — Organisms corresponding closely to *Micrococcus rheumaticus* have been isolated from one or more joints in eight out of eight cases of acute articular rheumatism in the early stages. Blood cultures were made in four cases and gave positive results in two. Cultures from the tonsils yielded similar organisms in two cases. Four gave histories of tonsilitis, two had pains in muscles. Experiments on rabbits, guinea-pigs, white rats and dogs show that the cultures are of coccus viridans, but less virulent than *Streptococcus hemolyticus* and pneumococcus. Injections in ear veins of rabbits gave nonsuppurative arthritis, endocarditis, pericarditis and myocarditis in the same animal. The strains obtained from the tonsils gave the same results as those obtained from the joints, except one obtained from the tonsils eight days later showed to grow the same way as *Streptococcus viridans*, and produced endocarditis but not myocarditis, pericarditis, or arthritis.[19]

[14]Rosenow, E. C.: Etiology and Experimental Production of Erythema Nodosum, J. Infect. Dis. 16:367-382, 1915.

[15]Rosenow, E. C.: The Pathogenesis of Focal Infection, J. N. D. A. 5:113-124, 1918.

[16]Rosenow, E. C.: Elective Localization of Streptococci from a Case of Pulpitis, Dental Neuritis and Myositis, J. Immunol. 1:363-373, 1916.

[17]Rosenow, E. C.: Experimental Infectious Endocarditis, J. Infect. Dis. 11:210-224, 1912.

[18]Rosenow, E. C.: Elective Localization of Streptococci, J. A. M. A. 65:1698, 1915.

[19]Rosenow, E. C.: The Elective Localization of Streptococci from Epidemic Poliomyelitis, J. Infect. Dis. 21:313-343, 1918.

[20]Rosenow, E. C.: The Etiology of Articular and Muscular Rheumatism, J. A. M. A. 60:1223-1241, 1913.

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A NEW TECHNIQUE FOR MANDIBULAR BLOCK

(*Continued from page* 380)

second finger and the end of the thumb shows the width of the ramus, thus helping the operator to visualize the position of the foramen. The thumb being in the position it is, by a slight movement, it assists in guiding the needle to its proper destination. Fairly heavy pressure of the thumb has a tendency to cause the patient to open the mouth wider and also eases the prick of the needle.

When injecting the left side, the operator stands slightly back of the right shoulder of the patient, and with the left hand inverted, the thumb is placed in position to palpate the left retromolar triangle (Fig. 3), while the hand grasps the jaw and cheek as show in Fig. 4. The same advantages will prevail as in the right injection except that the hand being inverted the width of the ramus will be measured by the end of the little finger and the end of the thumb.

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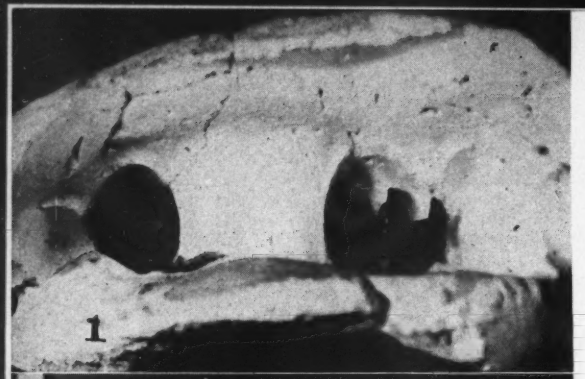
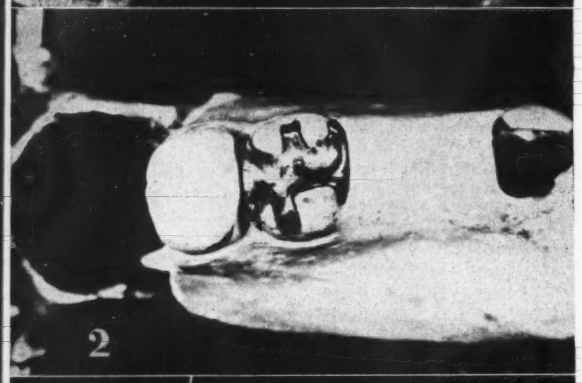
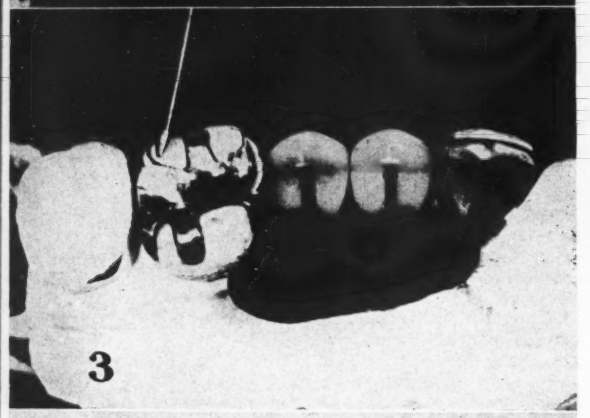
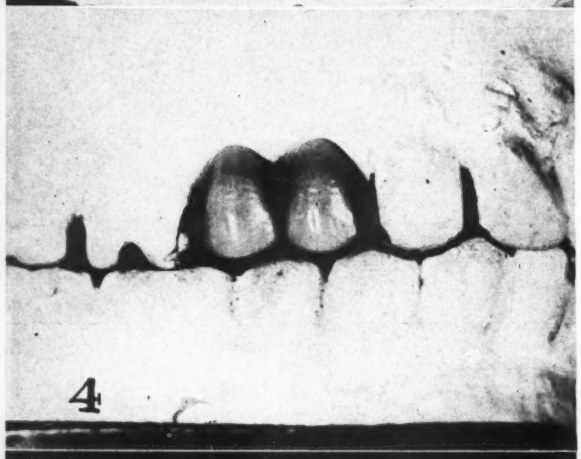
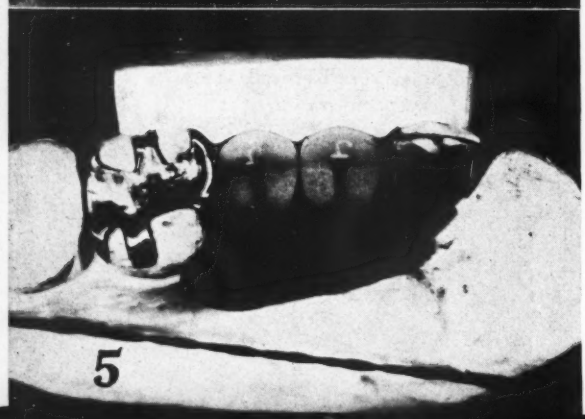










FIXED BRIDGE CONSTRUCTION FOR THE GENERAL PRACTITIONER

R. EDMOND REILLY, D.D.S.
Rochester, New York

1. With the attachments in place in the mouth, careful impressions in plaster are taken of both the area to be bridged and the opposing teeth. An opposing cast poured into a wax bite will defeat the purpose of accuracy.

2. Assemble the impressions in the trays and seat the castings firmly in place (Fig. 1).

3. The inner surfaces of the castings and the *outer surface that contacts an adjacent tooth* are waxed with a thin film of pink wax. It is imperative that this lining of wax be as thin as possible, as will be seen later.

4. The casts are made in a hard stone. Any material, such as plaster, which will crush or wear in closing the articulator numerous times cannot permit accuracy in the finished case, and will require spot-grinding in the mouth. Be certain that both casts are of stone.

5. The casts are mounted on an anatomic bridge articulator, with the castings in position (Fig. 2).

6. Selection of teeth to be employed is a matter for individual decision. In this presentation, reference is made to full porcelain pontics, as they are now the most generally used type. By grinding, reshaping, and staining as the case requires, natural appearing bridges result.

7. The cast is relieved sufficiently to permit snug fitting of the gingival portion of the pontics against the soft tissue. The degree of relief depends on the thickness and density of the tissue in each case. Do not relieve the cast too deeply. If pontics are seated too tightly against the tissue, there will be congestion and inflammation, despite highly glazed surfaces.

8. While grinding the pontics to place, they are held in position with modeling clay (Fig. 3). Allowance must be made for the cusps (Fig. 4), and this will vary according to the bite and protection required.

9. When the correct alinement, cusp clearance, and esthetic requirements are attained, the pontics are fixed firmly with sticky wax, and a permanent retaining wall (Fig. 5) is made to maintain the same position of the pontics throughout construction, and serve as a check for accuracy of the finished bridge. This wall is made by oiling the cast and pontics, and patting quick-setting plaster to place. Trim the excess plaster and remove. The wall includes the abutment teeth as shown in Fig. 6.

10. The backings and cusps are now ready to be made. Whether the operator prefers to use backings as furnished by the manufacturer or to cast his own is immaterial. In casting, the entire unit (that is, the backing and cusp) is waxed and carved as a single piece. If castings are to be used, it will be essential to expand the pattern more than for the ordinary small casting, or it will require grinding to allow the pontic to go to place accurately.

At this point, it is well to stress the size and depth of cusps. The smaller the working surface and the less accentuated the carving, the less strain on the abutment teeth, and the greater efficiency in the functioning of the bridge. Large cusps with deep grooves and sulci and decided overbite only tend toward food impaction, and excessive lateral thrust. The diagram (Fig. 7) illustrates the basic principle involved. When cusps and backings have been completed, the operator is ready for assembling for soldering.

11. Up to this point, the attachments that were lined with wax at the time of making the cast, have not been disturbed on the working cast. With the pontics and cusps removed, the two abutment castings are

Fig. 1—Castings seated in place in impressions.

Fig. 2—Mounted working cast with castings in position.

Fig. 3—Pontics held in position with modeling clay. The pointer in Fig. 3 indicates the fine line between casting and cavity outline after the wax has been burned out, and the case ready for assembling.

Fig. 4—Allowance is made for cusps in grinding pontics.

Fig. 5—Pontics fixed with sticky wax and permanent retaining wall to maintain position throughout construction.

warmed over a flame to soften the wax and permit easy removal from the cast. The slight spacing will be noted on the mesial surface of the cuspid and distal of the molar castings in Fig. 8. These spaces originally contained wax. If wax is not placed on the outer surface of abutment castings where there is an approximating tooth, it will be necessary to saw through the cast at this point to remove them.

12. All wax is burned off the castings, and they are replaced on the working cast. The necessity for a *thin* lining of wax will now be obvious. If it is too thick, it will permit too much play when replacing it on the cast. If there is motion after the wax is replaced in position, it is unsafe to continue.

13. Cusps and pontics are placed together and seated in their respective positions in the retaining wall.

14. A rubber band is stretched around the cast and wall to hold it firmly in position.

15. Tough sticky wax is flowed over the cusp and adjacent attachment.

16. A small piece of stiff wire is warmed and embedded into the wax to prevent distortion or movement in removing the sections for investing. This initial assembly is in two individual sections (Fig. 9).

17. These waxed sections are chilled and removed from the cast for investing. An investment must be used that can be successfully handled rather thin without the danger of breaking. I have found Kerr Number 5 the most satisfactory for soldering operations. This is mixed very stiff and placed on a glass slab. If placed on paper it will curl on the base, resulting in varying thicknesses and subject to fracture in handling. The two waxed sections are embedded in the soft investment until the gingival margins of the castings touch the slab. When set, the wax is softened in hot water and removed, and boiling water is poured over the sections to remove all wax residue. These sections are now ready for heating prior to soldering (Fig. 10). As they are to be soldered from beneath, it is imperative that the investment be thin and highly refractory. The investment shown in Fig. 10 is one-fourth inch thick. Rarely, if ever, does an investment measure one-half inch in thickness. Heat the sections thoroughly before soldering.

18. If there is any one step in fixed bridge construction which discourages dentists from doing their own case, I believe it is soldering. A few simple rules and a little practice will result in proficiency in soldering:

a. Clean the joints to be soldered.

b. Have the embedded metal and investment thoroughly and uniformly heated.

c. Use a minimum of flux.

d. Keep the solder away from the direct flame. Applying a blowpipe flame directly to the spot to be soldered burns the base metals out of the solder, and also oxidizes the joint. Keep in mind that a good soldered joint is a fused contact point.

e. Filling the interdental spaces with solder is not only unnecessary but interferes with cleansability.

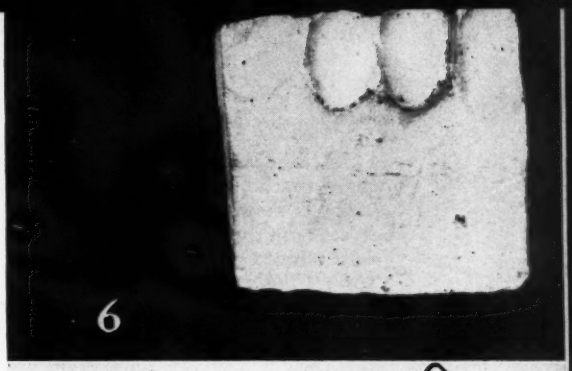
Many operators feel that fused contact points are not sufficiently strong. We have all seen such joints break. Examination of such a broken joint will reveal it to be full of borax pits and carbon spots, and it will be found imperfectly fused. Such a joint must give way under stress.

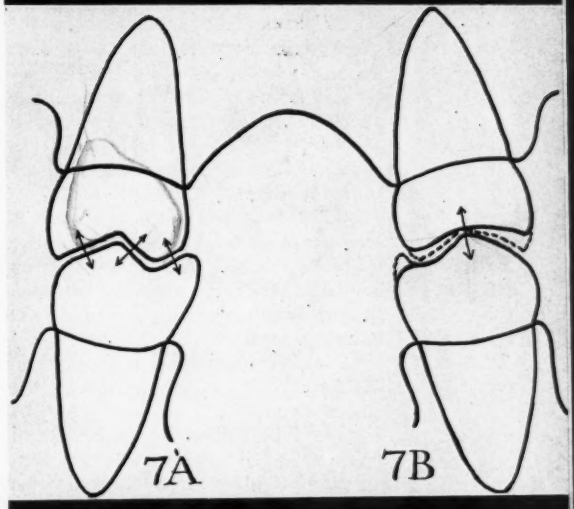
f. These misfortunes can be prevented by applying the flame from beneath on a ring stand (Fig. 11). Heat the invested case to a glow with the brush flame. Heat from the base until the metal is cherry red.

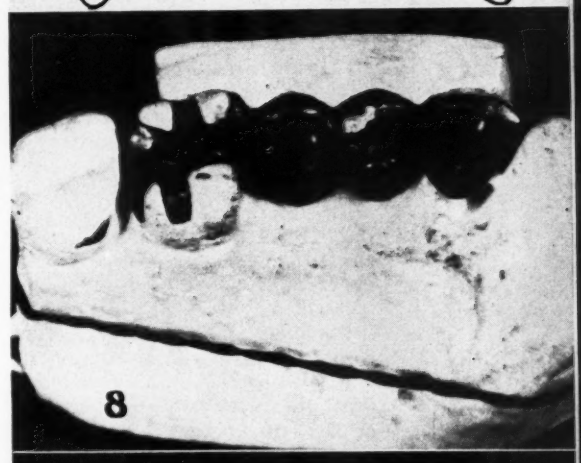
g. Apply a square of solder to the joint and concentrate the flame at this spot from beneath until the solder flows, and withdraw the flame to the other section and repeat the process.

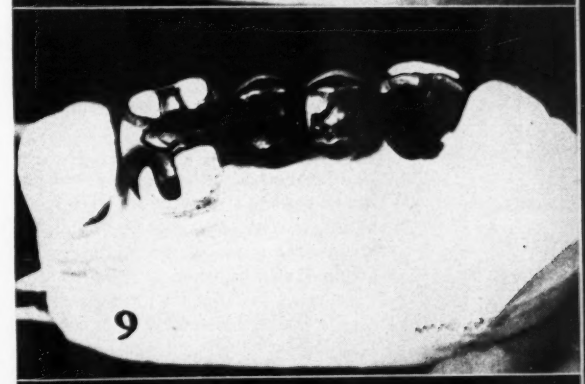
In the first soldering operation, when the two separate sections are soldered, 20 karat solder is used. If more than two sections are to be done, each is soldered with 20 karat in the first operation.

19. The soldered sections are removed from the investment, washed and pickled; the pontics are placed on backings and returned to the working cast.









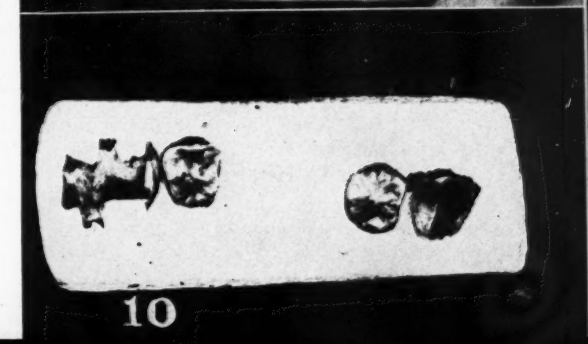


Fig. 6—Retaining wall includes abutment teeth.

Fig. 7—A shows normal occlusion with interlocking cusps. When food is crushed between these, the arrows indicate the direction of force on the inclined planes. It is seen that twice the force is exerted buccally on the upper, and lingually on the lower, as in the opposite directions. This lateral thrust results in excessive strain on the abutment teeth and tends to loosen the attachments. B, shows the modification of the buccal and lingual cusps of the upper and the lingual cusp of the lower, which permits food escapement in either direction and force in the long axis of the tooth, eliminating lateral thrust. This is an important factor in preventing fracture of pontics. Note the size and depth of the cusps of two bicuspids, as compared with the molars in Figs. 9 and 12.

Fig. 8—Spacing at mesial of cuspid and distal of molar attachments, allowed by waxing these surfaces in the impression. Permits removal from cast without sawing.

Fig. 9—Initial assembly is in two waxed individual sections.

Fig. 10—Two waxed sections embedded in investment.

20. The retaining wall is put in place to check the accuracy at this stage. If the wall does not fit exactly, it is certain that something was moved in the investing. Now is the time to correct the error.

21. If the sections and wall are exact, the final assembling and soldering can be done.

22. Clean the joint between the two bicuspids with fine cuttle discs before waxing.

23. Apply sticky wax to the entire occlusal surface from molar to cuspid, inclusive, and reinforce with stiff wire.

24. Check with retaining wall before removing.

25. Invest and burn out wax as before. This will present the entire occlusal surface exposed, allowing equal distribution of heat through the exposed metal and facilitating the final soldering.

26. This final joint is fused with 18 karat solder to prevent opening the other two.

27. The bridge is cleaned and pickled and returned to the cast with pontics in place, then checked with the retaining wall (Fig. 12).

28. Finish and polish, and glaze all ground surfaces of porcelain.

In the event that several days or more elapse between the time of taking the impression and completing the bridge, it is safer to have the patient return, and make the final assembly in the mouth.

29. Place the soldered sections on the teeth and take an occlusal impression.

30. Remove sections, place each in its position in the impression and cover remainder with investment.

31. Remove impression material, exposing occlusal surfaces, and solder at once.

32. Set the bridge the same day. This procedure is especially indicated in cases of three or more sections with scattered abutment teeth, as there is likelihood of slight drifting over several days.

Conclusion

This method of bridge construction is a composite technique acquired from many sources, over a period of eighteen years; it is not presented as an original contribution.

It is to be hoped that more dentists will be influenced to do their own fixed bridge construction in the future, and experience the genuine satisfaction of having completed a well made and accurate-fitting bridge, which does not require grinding of castings or abutments, or hammering and spot-grinding to seat in the mouth.

838 Mercantile Building.

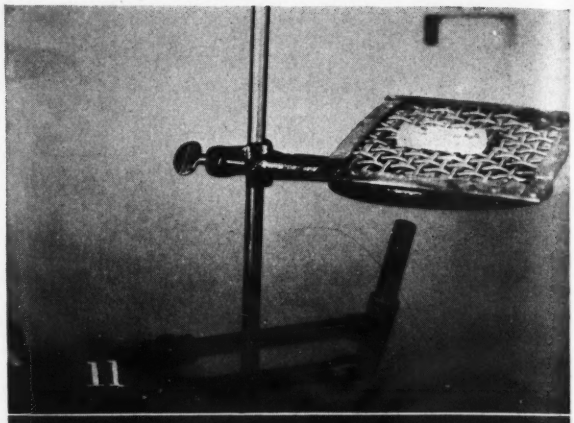


Fig. 11 — Flame applied from beneath on a ring stand.

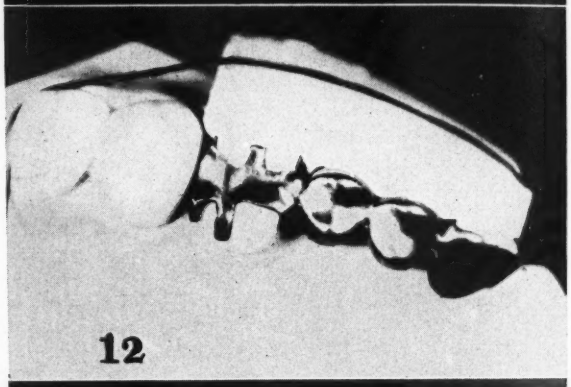


Fig. 12 — Bridge returned to cast with pontics in place and checked with retaining wall.

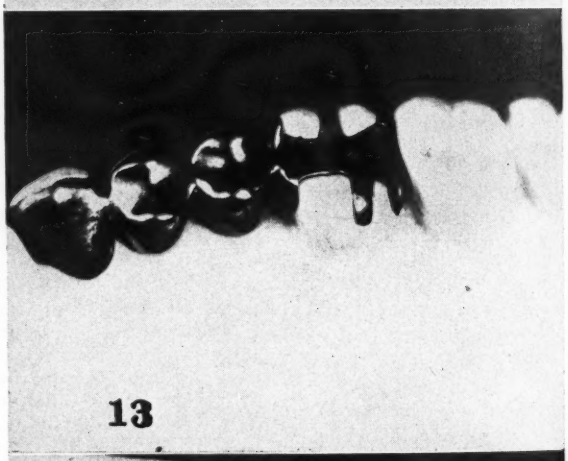


Fig. 13 — Completed bridge, occlusal view, showing soldered joints.

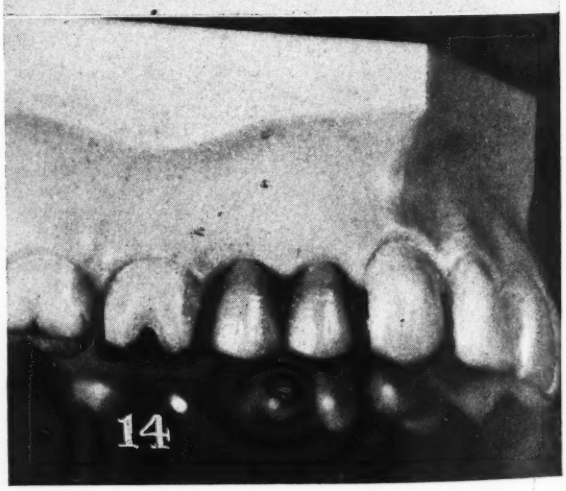


Fig. 14 — Buccal view of completed bridge, indicating: adaptation of pontics to soft tissue; cusp protection; cleansable interdental spaces: gingival margins of abutment castings accessible for cleanliness.

CHECKS AND BALANCE IN FULL DENTURE SERVICE

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Chicago

FULL denture construction, as it is generally taught and practiced today, is neither accurate nor scientific. As one writer put it, "Virtually every factor of denture construction is controversial."[1]

Articulators

Ever since artificial denture construction was begun, dental engineers have been trying to build some mechanical device which would correctly record the movements of the human jaw. Some of these hundreds of instruments are more accurate than others; some more nearly approach anatomic and mechanical precision; but the dentist and technician are still laboring in the field of full denture uncertainty. It seems strange that in all these years of study with articulators the student and teacher have as yet failed to solve the problem of mandibular relationship by *any* mechanical device.

Impressions Without Compression and Bites With Compression Make Accuracy Impossible (Fig. 1)

I do not believe that any student of denture construction will contend that it is possible to take an impression in the mouth without causing some physical change in the soft tissue. Certainly this must be conceded as no two impressions of the same edentulous mouth are ever exactly alike. The use of baseplate blocks must also be considered (Fig. 2).

Assuming that it is possible to construct a close-fitting baseplate to the stone or plaster cast, with wax rims attached, how can one determine when this base block rests against the soft tissue, exactly as in the original impression? If such contact is possible, what occurs to this soft tissue the moment the slightest contact is made when the bite blocks come together? Some section of the soft tissue beneath these blocks must undergo a physical change, and this change of tissue depends on three important factors: (1) softness of the tissue itself; (2) the contacting pressure from the mandibular force, and (3) the location of stress on the blocks themselves.

[1]LaDue, J. B.: Accurate Registration for Centric Relation, DENTAL DIGEST, 41:384 (December) 1935.

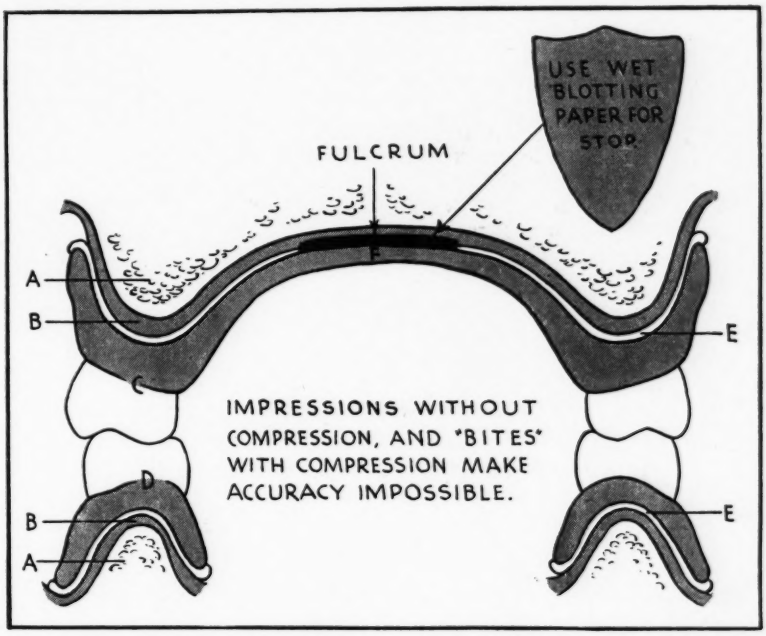


Fig. 1—"Stop" used as a fulcrum for occlusal balance. A, Hard tissue; B, soft tissue; C, upper try-in; D, lower try-in; E, paste lining; F, fulcrum block which prevents ridge compression.

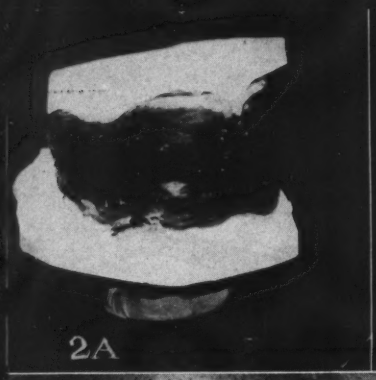
When warm wax is used between the bite blocks, balanced tissue stress is impossible, because it is necessary to have the wax temperature and wax bulk equalized at all the contact points in order to transfer the mandibular and tissue relationship from the mouth to the articulator. If accuracy is to be obtained on the articulator, it is obvious that the plaster casts must change their form exactly as the soft tissue alters its shape, and this is impossible. *A technique that compresses soft tissue, therefore, in obtaining a bite relationship and an articulator mounting of solid stone of a different form will show a discrepancy, and the distance between the upper and lower mounted casts will be decidedly longer than the actual distance between the upper and lower mouth ridges if the centralizing axis of the articulator and of the mandibular condylar position are relatively equal.*

Discrepancy in Transferring Bites

Two suggestions have been made to overcome the discrepancy resulting from transferring bites from the soft tissue to casts of hard structure: First, bite blocks may be constructed to the approximate jaw relationship and soft plaster or zinc oxide paste may be used between the blocks to prevent any tissue compression. Second, bite blocks may be constructed and the impression taken at the time that the bite relationship is to be established.

With try-in base blocks one is never sure that the tissue contact is as accurate as the original impression. A little intensive seating pressure or air displacement beneath the bite block results in some discrepancy. The most serious inaccuracy, however, occurs from an abnormal condition of the soft tissue when impressions are taken (heat, compression, displacement) and the normal condition of the tissue when bite relationship is attempted.

When attempts are made to place plaster or paste linings in base-plate blocks to take impressions at the time of taking the bite, it becomes a difficult task even with a centralizing block stop. If the two blocks are locked together, it is almost impossible to dislodge the impression from the mouth without distortion.



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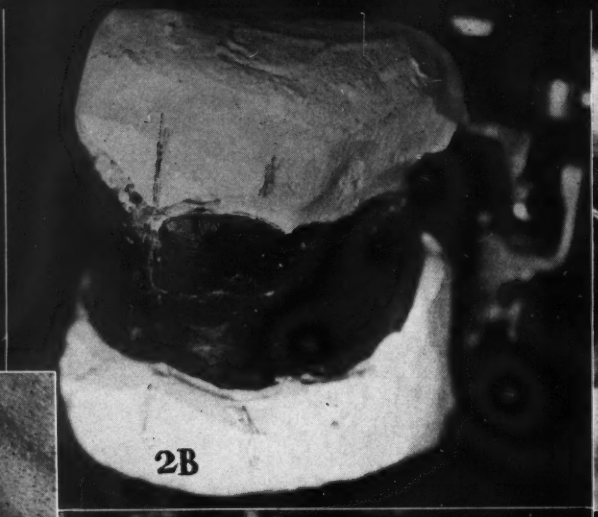

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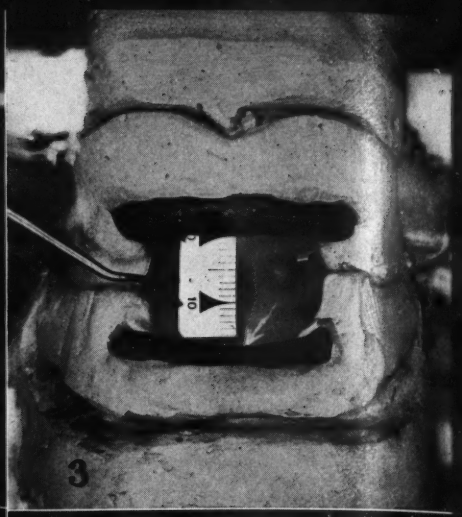

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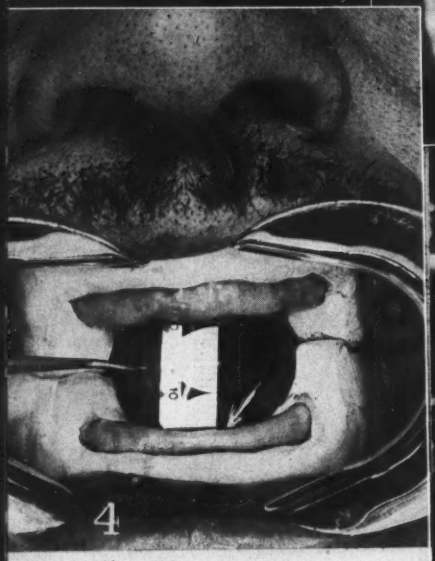

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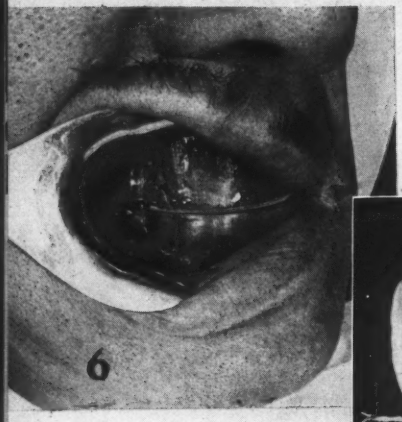

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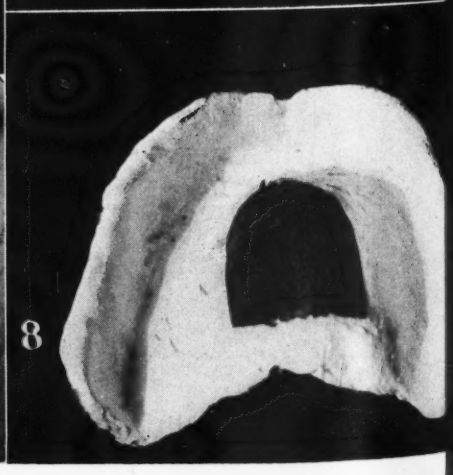

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There has been some contention that the thin soft tissue over the central palatine hard area would prevent ridge compression in the taking of bites. A balance is almost impossible under biting force with merely a hard centralizing zone. Certainly the opposing lower ridges yield under pressure. It must be recognized that the difficulty in the bite problem arises from the resisting as well as the nonresisting properties of the tissue.

Determination of Centric Occlusion

In order to determine centric occlusion, some operators use paralleled flat metal plates attached to occlusal rims with a central screw contact for mandibular tracings. The determination of centric occlusion rests principally in the ability of the operator to harmonize impressions and bite relationship for articular duplication. There has been a great deal of discussion concerning the "intra-oral" and "extra-oral" technique in check bites.

Experiment for Articular Duplication

1. Select an edentulous case with fairly well-defined ridges and take impressions in any manner desired.

2. Pour the casts, make bite rim blocks, and mount on the articulator in the usual manner.

3. The facebow is not used as much as formerly in mounting casts upon the articulator, but I believe that this instrument should be used in full denture construction.

4. When the bite relationship has been determined, seal the blocks together or make grooved locks, so that the blocks may be removed and returned from mouth to articulator as often as desired.

5. Cut off the section of the blocks from cuspid to cuspid, so that there will be full exposure of both the upper and lower anterior ridges when placed in the mouth.

6. Choose some definite landmarks on the exposed gum ridges and mark in such a manner that the location markings will be recognized on the cast.

7. With the bite blocks in the mouth, measure the exact distance between these ridge points and then transfer the block to the articulator and note the discrepancy. (The mouth must be closed as firmly as when the bite was taken.)

If the cuspid point on the right side from upper to lower ridge was 28 mm., for example, and on the left side at the same high area was 29 mm., and in the center of the mouth was 26 mm., when the bite blocks are removed and placed on the articulator, the distance between the casts will be found to be greater than the actual mouth measurements (Figs. 3 and 4). This discrepancy should prove that the soft tissue of the mouth and the hard structure of the cast on the articulator will always show a difference in shape as well as in dimensional relation. It should be unnecessary to state that a checkbite from a solid structure placed in the mouth on soft tissue will check because of the yielding property of the structure that lies beneath the try-in case.

When centralizing pin tracing methods are used to obtain centric relation, it is impossible to mount the casts on the articulator exactly as in the mouth relationship. If, however, it were possible to place a tracing pin directly in the center of an equalized upper and lower occlusal bite rim plane, the gothic arch tracing would still indicate centric position regardless of a slight opening of the bite on the articulator as a result of the tissue compression.

Check-Bite Experiment

The dentist should not rely too much on the check bite. The inaccuracy of the check bite may be tested by the following experiment:

Mount a case on an anatomic articulator with Trubyte posteriors set in balanced occlusion. Then prepare modeling compound or a solid metal block check to record right and left lateral and anterior contact rests; remove try-ins from casts and place in the mouth. When the positions of the extended "rests" are confirmed by observation in the mouth as well as on the articulator, the following changes are made with these waxed set-ups. With the waxed teeth placed upon the articulator, proceed as follows:

1. Remove the lower try-in and place a 40-gauge metal foil on the crest of the ridge on one side; return to position, and adjust it over the partly foiled cast.

2. On the other side place the foil directly over the occlusal surface and close the articulator. By this arrangement the articulator is slightly open owing to the addition of the foil between the teeth and on the cast. To illustrate this principle, occlusal bite planes are used instead of waxed set-ups (Figs. 5 and 6).

3. When the foil between the teeth is removed, it is apparent there will be no contact of the teeth on this side. This may be verified by drawing carbon paper between the teeth; of course, on the opposite side there will be a definite contact.

4. With foil now attached to the inside of the lower on one side, place both the set-ups in the mouth.

5. With digital and mandibular force seat the cases in position. The mandibular force will in a short time cause adaptation and toleration. If a piece of carbon paper is now placed between the teeth, or between occlusal bite rims, they will register contact on each side. The soft tissue makes this marking possible; in the case of check-bite blocks, the blocks may be placed in the mouth, and from observation will appear to be again in perfect balance. This further substantiates the statement that accurate check bites are impossible.

Articulator Inaccuracy Corrected

Articulators are indispensable in denture construction, but there are limitations as to their usefulness. The skilled dentist can give excellent service by the use of the articulator, but the average operator who uses "mush bites," or slips in hot wax here and there to fill in where there is lack of contact in the bite blocks, or determines the occlusal plane with carborundum plaster blocks invites trouble.

Any dentist may improve his denture construction by changing from the old system of *primary ideal casts* with checks and balance to a technique of taking final impressions *after setting up the teeth.*

The technique of finishing dentures from the articulator casts is slowly losing support. This is apparent by the action of many leading prosthodontists who openly advocate relining of new dentures.

There is an apparent lack of con-

Fig. 2—A, Base-plate blocks, commonly termed occlusal rims, often called bite blocks or bite rims, waxed together with cast in position. B, Mounted on the articulator with approximate mandibular relationship.

Fig. 3—Actual size. Ridge position of tissue with a section of base-plate blocks cut away on articulator. Note distance between cast on articulator as compared with actual mouth measurements in Fig. 4.

Fig. 4—Actual size. Exact relationship of ridges in the mouth.

Fig. 5—A, Carborundum plaster occlusal bite rims ground to plane; B, articulator open.

Fig. 6—Foil, 30-gauge, between lower bite rim and tissue on left side only; shows no change in block contact.

Fig. 7—Dark areas indicate location of ridge compression.

Fig. 8—Position of blotting paper block. Note that there is no ridge compression.

Fig. 9—Position of blotting paper over soft paste, ready for insertion in the mouth. (Soft part of blotting paper against tissue.)

Fig. 10—Manner of holding case in mouth to obtain muscle registration.

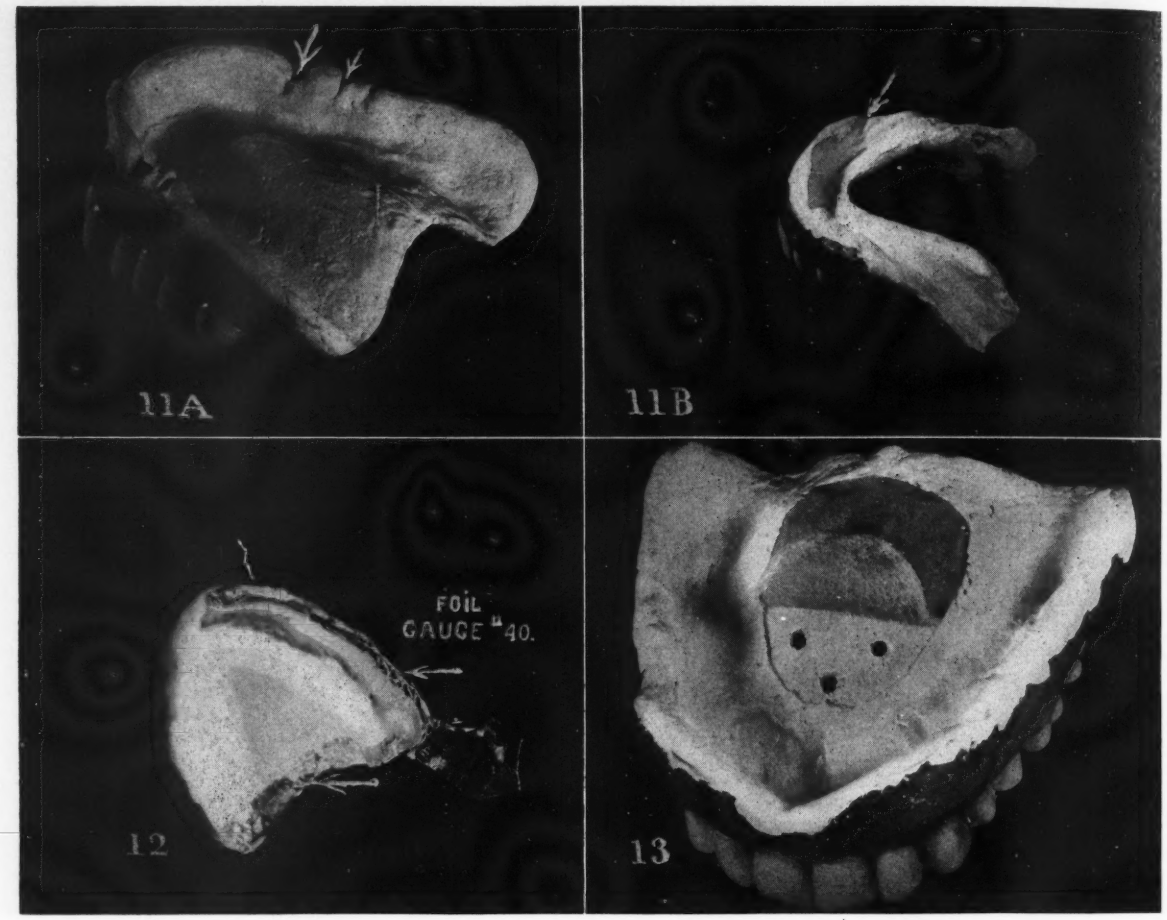

Fig. 11—A and B, Muscle registration.

Fig. 12—Foiling sides of paste impression to compensate for cast foiling in condensites and resins.

fidence in their ability to establish in the mouth the balanced occlusal relationship of the articulator. In other words, it is an admittance that corrective measures are necessary even after every precaution is taken to construct dentures from the articulator casts.

In the technique presented here the corrective principle of the denture reline is not only incorporated with a saving of time and labor, but the operator in establishing a new impression base may also alter the tooth relation without the necessity of grinding which is required in a completed denture.

Usually the greatest error that occurs in denture construction does not arise from mistakes in occlusion and the set-up, which can be mastered on the articulator, but in establishing the relation of the denture base to the mouth tissue, after these important factors are obtained.

The common practice of setting up teeth and finishing from casts made from ideal impressions is not sufficient, and it is my contention that the articulator set-up should be used only as a base in obtaining the final impression. In other words, mounted casts should not govern entirely the fit, tooth balance, and occlusion; but rather the established tooth balance should control the impression.

Study of Impression Materials

Before describing the technique advocated in this article, it is necessary to refer to our present impression materials. During the last four years the development of metallic oxide impression pastes has resulted in a more thorough study of impression material as a whole. The results of these investigations in general may be summed up as follows:

All materials that are softened by heat and placed in the mouth at a temperature above 100° F. cause marked changes in the soft tissue. The rapidity and extent of this hyperemic dilatation depends on the intensity of the contact heat.

Plaster of Paris and its derivatives in setting not only generate heat but act as powerful dehydrating agents. Whereas it is barely possible that a thin plaster wash will not create as much heat as bulk plaster, nevertheless there is a decided change in form in the material itself in the process of "setting."

Action of Heat

Behavior of tissue under the action of heat is interesting; in some mouths the thermo-activity of tissue is more pronounced than in others, but all soft tissue is affected by heat and cold.

A simple experiment of the action of heat may be made by covering a band ring on the finger with warm wax or modeling compound. In a few minutes it becomes more difficult to remove. Moreover, it must be remembered that soft tissue is far more vascular and sensitive than the skin of the finger.

If a mouth test is desired, cut a palatine "window" in an adapted base or denture and fit a metal disc in the opening. Seat the case in the

mouth and apply warm compound over the section and in a few minutes the disc will be forced out on account of tissue expansion.

Impression Paste

Metallic oxide impression paste, which usually consists of zinc and aluminum oxide with various resinous gums, phenol, and essential oils, presents properties entirely different from wax compounds and plasters. First, the paste is virtually heatless in the process of setting or hardening. Many dentists who have used pastes are confused by the patient's expression of "burning" but it must be recognized that there is a decided difference between placing hot wax against tissue and applying a weak carbolic acid compound against such surfaces. If a thermometer is placed in soft paste during the process of setting in the mouth, it will be noted that there will be no rising of temperature above the body heat.

Paste may be used with the minimum amount of bulk and the contracting qualities in the process of hardening are toward the tissue. All other products draw toward the bulk of the material. Paste may be left in the mouth for hours without injury to tissue; should peripheral seals and post-damming be required, this may be done simply by adding more paste to an impression. Because of the outstanding qualities of zinc oxide paste, it is advocated in the technique suggested in this article.

Technique

1. Modeling compound snap impressions are taken with muscle registration, but digital manipulation of the lips and cheeks should not be attempted.
2. Stone casts are poured.
3. Shellac, or wire supported wax base plates are prepared and bite rims are added to obtain mandibular relationship.
4. The case is mounted on an anatomic articulator. The use of the facebow is advised.
5. Any accepted method for mandibular tracing and centric relation may be used.
6. Teeth are selected and arranged as desired. Mechanical teeth are perhaps better for the average case.
7. Try for esthetics and make any necessary changes.

Comments

Up to this point there is little distinction in the general denture technique described, but I wish to point out three important factors in denture construction which should be observed:

First, when the natural teeth are removed the ridge tissue in all mouths gradually give way under the stress of mastication. This is particularly true in cases of recent extraction. It is advisable, therefore, in setting up teeth to allow a slight space between the upper and lower anteriors in order to compensate for tissue changes. This also prevents the usual dislodging tendency which follows when the mandible moves forward.

The second factor: Denture patients who are unilateral chewers should have the occlusal plane incline upward on the favored masticating side. Attempts to change condylar defects with appliances supported solely upon mouth tissue will ultimately destroy the ridges.

The third factor is that of the correct distribution of masticating force on the ridges. The general principle is to avoid setting the teeth too far back on the dentures. It is better practice to use fewer posteriors, selecting those that correspond to the buccolingual ridge dimension than to have a mesio-distal rocking chair arch, which, regardless of articular and mandibular balance, causes difficulties.

From the mechanical standpoint, the most efficient masticating area is located in the center of the yielding structure (denture), and at the point of centralizing force. As a general rule denture patients masticate food in the location of the second bicuspids and first molars, and not in the second molar region.

That this particular area is used more than any other section of the masticating surface may be verified by applying a paint (cellulose) over the tooth surface and note the result after the dentures have been used. While deposits on dentures are usually located near the openings of the salivary ducts, masticating areas which really function are notably cleaner than on any other part of the denture.

It is difficult to reason just why Nature created upper teeth so that the molars occlude farther back in the mouth than the lowers and yet the movement of the mandible is forward. This is certain: In denture construction there should be no mechanical interference by adding teeth because of the desire to reproduce the natural condition.

Dislodging of dentures usually arises from two sources: physical force from the various tissue structures in the mouth; and from force exerted on the nonfunctioning areas of the dentures. Attempts to masticate solid food at the heel of the denture or on the anterior teeth where it is difficult to establish a proper fulcrum result in displacement.

Technique Continued

8. To correct articulator inaccuracies, remove the try-ins from the articulator and first seat the upper firmly in the mouth. A little plate powder may be used if necessary. Next prepare a mix of paste and to the thoroughly dried lower apply a coating inside and seat gently in position in the mouth, directing the patient to close lightly. By having the patient "tap" the teeth gently together, correct balance can be obtained without compression.

If the dentist is fearful that he cannot control ridge compression in the lower, he may use a 60-gauge foil over the cast on the crest of the ridge area in preparing the original base plate. By removing the foil just before taking the final impression, there will be little danger of ridge compression (Fig. 7).

9. The paste should be allowed to harden in the lower. This requires about five or ten minutes; then remove the upper try-ins, dry, and make ready for the paste mix.

10. To obtain mandibular balance and no ridge compression on the upper, a piece of blotting paper which has on one side a hard surface, is cut to the shape desired (may be shaped like a "relief" when wet and partly fitted to the set-up so as to prevent shifting, when placed in the mouth. The blotting paper is removed, the case dried, and a mix of the paste applied. The damp blotting paper is adjusted over the soft paste lining and seated in the mouth (Fig. 9). This keeps the hard base plate from compressing the ridge tissue and acts as a fulcrum for occlusal balance (Fig. 8).

11. The case is carefully seated in the mouth and the patient is instructed to close firmly while the operator steadies the teeth with his fingers. Muscle registration is accomplished by drawing in the cheeks (Figs. 10 and 11). As the blotting paper prevents the hard base plate from contacting the soft tissue, considerable stress may be placed on the case without distortion.

Because the blotting paper acts as a "stop" it may slightly open the bite; but as the teeth are in balanced occlusion, the only change that might occur is corrected by the paste impression. In other words, the teeth relationship controls the new base impression.

12. As the hard palatine bone is

near the surface at this point, it is advisable to remove a part or all the blotting paper to create a slight relief when the paste impression becomes hard.

13. The area can be made smooth and even by burnishing a thin tin foil over the relief area before the case is poured.

14. When the paste becomes hard in both the upper and lower set-ups, one must be careful in removing from the mouth. As a rule the paste "sets" in from five to ten minutes, but a much longer time should be allowed to insure absolute hardness. Removal should not be forced. Cold water should be used freely, and "blowing" by the patient, or the use of compressed air will aid without distortion.

15. Some operators like a peripheral seal and a postdam. This is easily accomplished by thoroughly drying and applying a little fresh paste at the margins and across the heel. One should be careful not to use too much paste. It is important that the second application does not run over the ridges or palatine areas as the impression and bite relationship will be ruined.

16. When the paste-lined set-ups are exactly as desired in the finished dentures, they should be poured at once and prepared for direct flasking.

17. It is unnecessary to use a separating medium with paste, but when some delay is necessary, such as shipping to the dental laboratory, a single application of a floor wax will prevent cracking or breaking.

18. For dentists who foil casts for condensites and resins, the suggestion is made to burnish a 60-gauge foil on the inside from the cervical margin down three-fourths the distance toward the ridge crest, before the impression is poured. On the upper, a narrow strip is added across the distal part of the palate. It is not advisable to cover the entire impression but only at the points where cast foiling may result in looseness of the denture (Fig. 12).

Comment

Attention is directed to a common mistake in taking impressions; that is, ridge compression. This is particularly noticeable in cases in which the operator uses a double impression technique, such as modeling compound, wafers, and wax, with mixes of plaster or paste inner linings. In such cases spots are bared over the ridges (Fig. 7). This does not mean that tissue should never be compressed or displaced in taking impressions; but it is questionable practice to compress ridges in the line of mandibular force, for the resilience of this tissue is so tense that it will later certainly loosen the denture.

Summary

1. Attempts to solve the problem of reproducing mandibular movements of the human jaw by engineering means, with a mechanical instrument, have resulted in failures.

2. The system of check bites as practiced today is inaccurate.

3. The use of the articulator and facebow is necessary in full denture construction.

4. Impressions without compression, and bites with compression make accuracy impossible.

5. It is impossible to determine the exact change which occurs in soft tissue when impressions and bites are taken. Conditions are never the same.

6. Final impressions should be made in the "try-in" after occlusal balance has been established with a corrective paste. (Relining of new dentures admits error.)

7. Ridge tissue should not be compressed in the line of force in taking impressions.

8. Avoid anterior contact in setting up teeth.

9. Mechanical teeth rather than anatomic teeth are recommended.

10. Teeth should not be set far back in the mouth.

11. For the "try-in," paste is placed in the lower set-up first.

12. A damp blotting paper "block" or "stop" is used as a fulcrum in the upper set-up in taking the impression.

13. Plenty of time should be allowed for the paste lining to harden.

14. Invest in flask direct from mouth.

15. Foiling impression at margins compensates for cast foiling.

55 East Washington Street.

ABOUT OUR CONTRIBUTORS

Lloyd D. Idleman has previously contributed to the dental literature. Doctor Idleman passed the Oregon State Board of Dentistry at the age of 18 in 1897, and since then, as he writes, he has "spent over forty-five hundred dollars in special courses and clinics." Doctor Idleman is a member of the American Dental Association and component societies. He has been engaged in institutional practice for the last fifteen years. At present he is resident dentist at the Oregon Fairview Home.

S. Harrington Stein (B.A., New York City College, 1921; D.D.S., New York University) has previously contributed to the dental literature. Doctor Stein is a member of the American Dental Association and the First District Dental Society of New York. He was an instructor in orthodontia at New York University College of Dentistry from 1930 to 1933. Since 1935 he has been a Staff member in the Orthodontia Department at the Hospital for Joint Diseases. Doctor Stein specializes in orthodontia.

Oscar Karpf, D.D.S. was graduated from the University of Illinois College of Dentistry in 1933. Doctor Karpf is a member of the A. D. A., the New York State and the First District Dental Societies, and has a general practice. Doctor Karpf's article is his first to be published; it was his senior thesis and was submitted by the University of Illinois.

Roe Edmond Reilly received his D.D.S. in 1918 from the University of Pennsylvania. Doctor Reilly is a member of the American Dental Association, the Rochester Dental Society and the Rochester Dental Study Club of which he has been leader of the group on fixed bridge construction for two years. Doctor Reilly has a general practice.

Ernest Byron Kelly, D.D.S. (University of Illinois College of Dentistry, 1902; L.L.B., Chicago Law School, 1913) has on several occasions contributed to the dental literature and in 1930 was the editor of *Dental Firefly*. Doctor Kelly is a member of the American Dental Association and is on the Board of Directors of the Chicago Dental Society. He specializes in the construction of artificial dentures.

The Editor's Page

NOT many years ago the expressions *temporary dentures* and *permanent dentures* were widely heard in dental circles, but in the last few years these terms have lost favor. We have come to learn that there is hardly anything like a *permanent* denture. Some do last a lifetime whereas others give satisfactory service for only a short period. We used to place the emphasis on something inherent in the denture materials. In other words, we spoke to patients as if a *permanent* denture had within itself indestructible lasting qualities that were not in a *temporary* denture. Actually the only difference between the two is to be found in the use of somewhat better materials and in a little more precise technique in making the *permanent* denture. The terms *temporary* and *permanent* dentures were legacies from our strictly mechanical conceptions of dentistry. Now the emphasis is placed on the vital tissue upon which the denture is placed.

It seems that what makes some dentures give service over a longer period of time is not the inherent nature of the material used but the condition of the supporting tissues. The emphasis has shifted from the mechanical, material concept to the biologic, less tangible concept. The rate of resorption of the bone under the denture may be influenced by local factors: occlusal strains and local tissue irritation; but probably the most important factor is a metabolic one.

It has been common clinical experience that persons who lose their teeth early in life, because of devastating caries, before the supporting bone has been invaded, get along extremely well with dentures and sometimes have long years of service from the original insertion. Conversely, persons who lose their teeth because of extensive periodontal infection which probably represents some index of lowered bone resistance have a great deal more difficulty with dentures. Resorption seems to continue to take place under the base and frequent renewals are necessary.

In this issue we are presenting a chart which we hope will be useful in demonstrating the biologic aspect of denture construction to patients. In the past, dentists themselves have taken most of the responsibility for denture life. Even after a period of years, if a denture ceased to give satisfaction because of tissue change, the patient frequently felt that it was due to a mechanical fault in the denture itself. Such a patient would not hold his tailor responsible for the failure of a suit of clothes to fit if the person had gained or lost weight. Moreover, this patient would not hold his oculist responsible because some biologic change had taken place in his eyes after glasses had been prescribed and worn for several years.

In both these examples any change would be correctly attributed to a metabolic disturbance of the person for which neither the tailor nor the oculist would be held responsible. Although these are rather homely analogies they are applicable to denture construction.

Except for tissue change as a result of serious local stress, the dentist has little or no control over the amount and kind of tissue resorption under a denture. If the patient's general condition is favorable and his metabolism is normal the rate of change will probably be slow. If, on the other hand, some serious biologic disturbance occurs, bone resorption may take place.

If these facts are made clear to patients at the time dentures are constructed, serious misunderstandings may be prevented.

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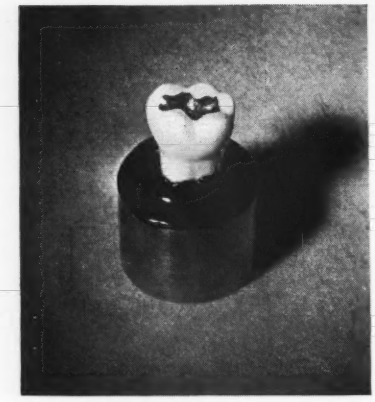

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STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS, OF AUGUST 24, 1912.

Of The Dental Digest, published monthly at Pittsburgh, Pa., for October 1, 1936.

State of Pennsylvania, } ss.
County of Allegheny, }

Before me, a Notary Public in and for the State and county aforesaid, personally appeared M. B. Massol, who, having been duly sworn according to law, deposes and says that he is the Publisher of The Dental Digest, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in Section 411, Postal Laws and Regulations, printed on the reverse side of this form, to wit:

1. That the names and addresses of the publisher, editor, publication manager, and business managers are: Editor, E. J. Ryan, B.S., D.D.S., 708 Church Street, Evanston, Ill. Publisher, M. B. Massol, 1005 Liberty Ave., Pittsburgh, Pa. Publication Manager, R. C. Ketterer, 1005 Liberty Ave., Pittsburgh, Pa. Business Manager, J. J. Downes, 1005 Liberty Ave., Pittsburgh, Pa.

2. That the owners are: Dental Digest, Inc., 1005 Liberty Ave., Pittsburgh, Pa.; Oral Hygiene, Inc., 1005 Liberty Ave., Pittsburgh, Pa.; M. B. Massol, 1005 Liberty Ave., Pittsburgh, Pa.; Louise A. Smith, Schenley Hotel, Pittsburgh, Pa.; Lynn A. Smith, 1005 Liberty Ave., Pittsburgh, Pa.

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(Signed) M. B. MASSOL,
Publisher.

Sworn to and subscribed before me this 5th day of October, 1936.

(Seal) E. G. Burgdorf, Notary Public.
(My commission expires May 11, 1940.)

PATENT OFFICE CENTENARY

THE phenomenal progress of the dental profession from the days when aching teeth were pulled by the village blacksmith to the modern science of face restoration will be reviewed in brief form in connection with the Centennial Celebration of the American Patent System in Washington, D. C., November 23, 1936.

Celebrants of the anniversary will not be allowed to forget that it is almost exactly 90 years to the day since Doctor W. T. G. Morton, a Boston dentist, introduced ether to end the terror of operations.

Attention will be centered, however, on some of the devices and instruments which have been developed and put into use to bring dentistry to its present state of a high art.

Extractor Patents

Harking back to one of the earliest patents granted in this country, No. 178—the total is now well above 2,000,000—a forerunner of the modern dentist, named Thomas Bruff, of Maryland, was granted patent rights on the first extractor on June 28, 1797. The old turn key came in with the David H. Dickey patent, No. 902, granted August 30, 1838; and the first forceps were represented in the Edward Bourne patent, No. 6741, granted September 25, 1849.

Articulator Patents

The dental articulator, modified greatly in recent years, had its beginning in the Daniel T. Evens patent, No. 1,743, which was granted August 28, 1840. Later William E. Walker devised an improvement to reproduce many of the jaw movements, protecting it under patent numbers 566,949 and 566,950 on September 1, 1896. The Charles E. Luce patent, No. 1,009,912 was a simple form of articulator designed to reproduce all the jaw movements by wax paths.

Alfred Gysi placed his "adaptable" articulator on the market under patent No. 1,041,270 granted October 15, 1912 and a later development was the George S. Monson articulator No. 1,457,385 patented June 5, 1923, which was based on a spherical theory of occlusion. More recent articulators have been patented by Frank M. Wadsworth in 1919; William A. Lentz in 1926; George G. Phillips in 1928; Rudolph L. Hanau in 1928, and Gysi in 1928. These have a multiplicity of adjustments and demand the use of considerable skill in their use.

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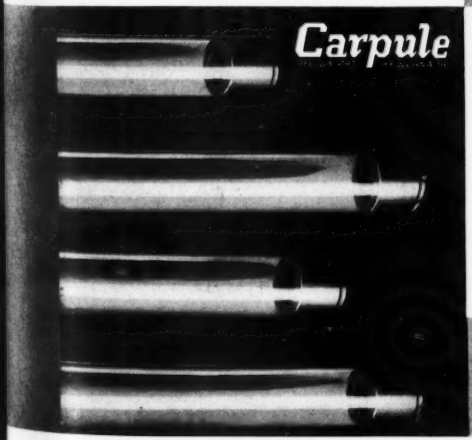

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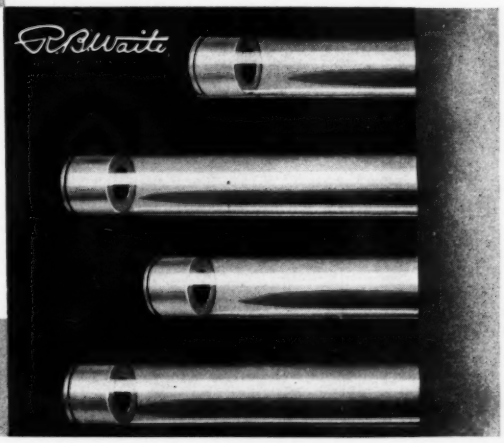

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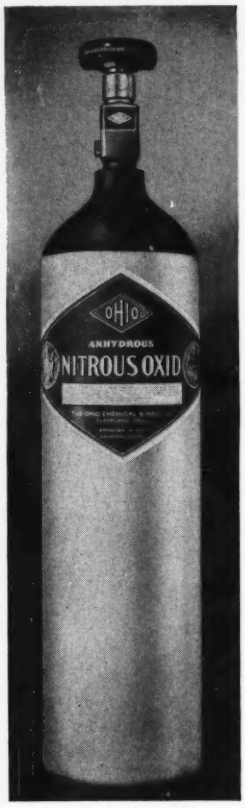

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An accessory to the articulator, the trifurating device, was devised by Milus M. House of Kansas City, Missouri, and patented August 2, 1927 as No. 1,637,569.

Tooth Patents

The first thought of inventors applying themselves to tooth reproduction was to make the occlusal surfaces of replaced teeth exact duplicates of the natural teeth. Later, other forms of occlusal surface appeared on various mechanical theories of improvement. Notable among the latter are the Victor H. Sears channel teeth, patented August 21, 1928 and the Gysi teeth patented April 10, 1928. The Gysi patent called for the use of special carving knives operated about the rotation centers of an articulator.

A radical departure from the interlocking cusp form of tooth came with the Rupert E. Hall patent No. 1,837,042, granted December 15, 1931 which eliminated cusps.

Bridge Teeth Patents

The review of dental patents shows that teeth for bridges have been developed along two general lines, an interchangeable facing type and a permanently fixed type. The fixed type provided for many modifications to form a permanent connection with the bridge member. Most of the interchangeable facings are covered by the Thomas Steele patent, No. 705,546, granted July 22, 1902 and the recent root-end forms are based on the Arthur S. Levy patent No. 1,905,595, granted April 25, 1933.

Denture Base Patents

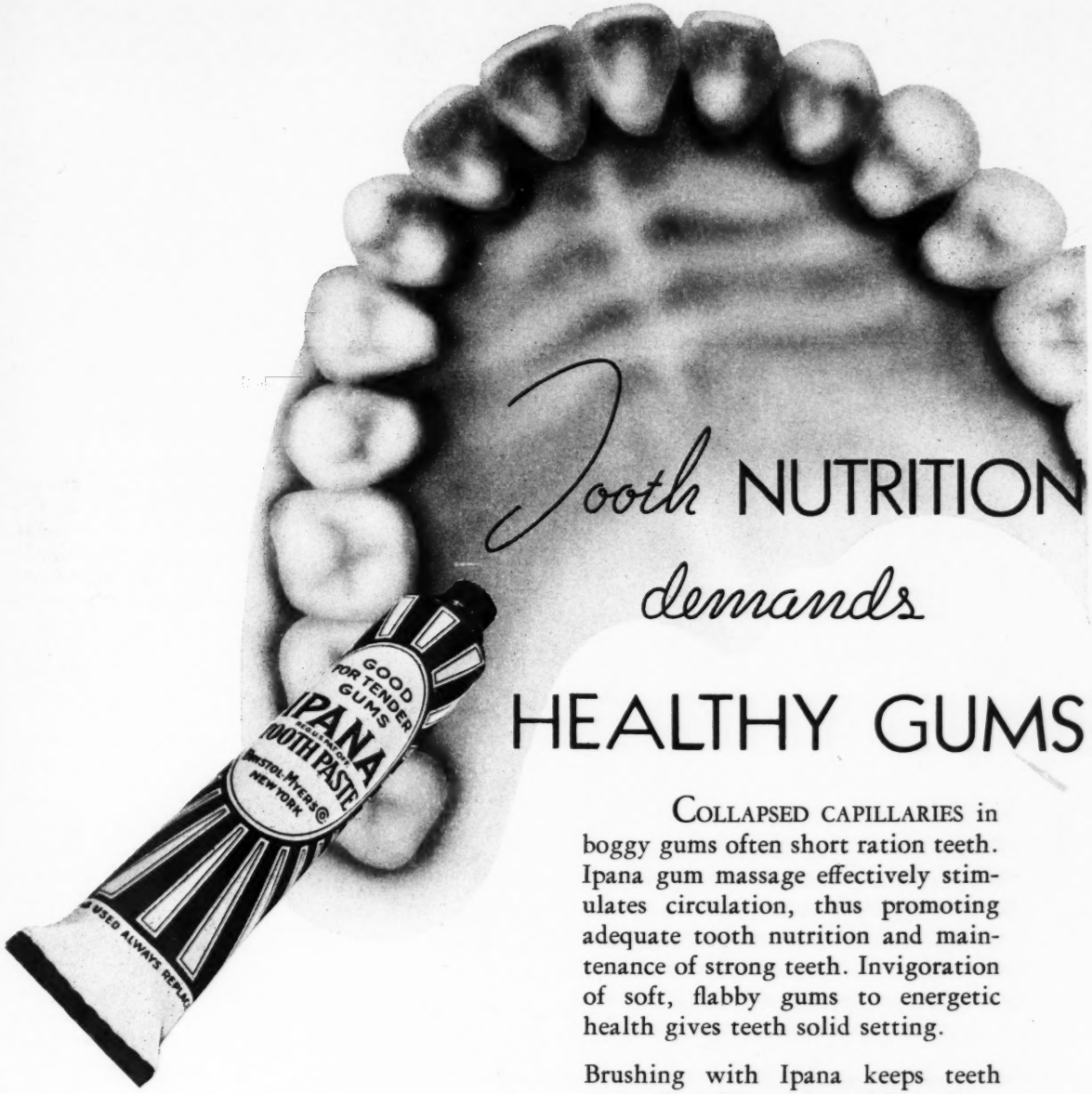
A modern dentist who attempted to slip the equivalent of a dinner plate into a patient's mouth as a full denture would have little standing in his community or profession, yet the first plates patented by Mahlon Loomis of Cambridgeport, Massachusetts, under No. 10,847 on May 2, 1854 were made of porcelain. By June 7, 1864, however, John A. Cummings received patent No. 43,009 for vulcanized rubber plates and numerous other patents have been issued for plates made of celluloid, resins, and alloys.

Impression Patents

Plaster of Paris, wax and wax-like compounds have been patented and used for taking impressions for many years, but on June 5, 1928 Poller patented a resilient impression compound as patent No. 1,762,776.

Tray Patent

Trays are represented by the James Harrison patent No. 8,312 which was granted on August 26, 1851.



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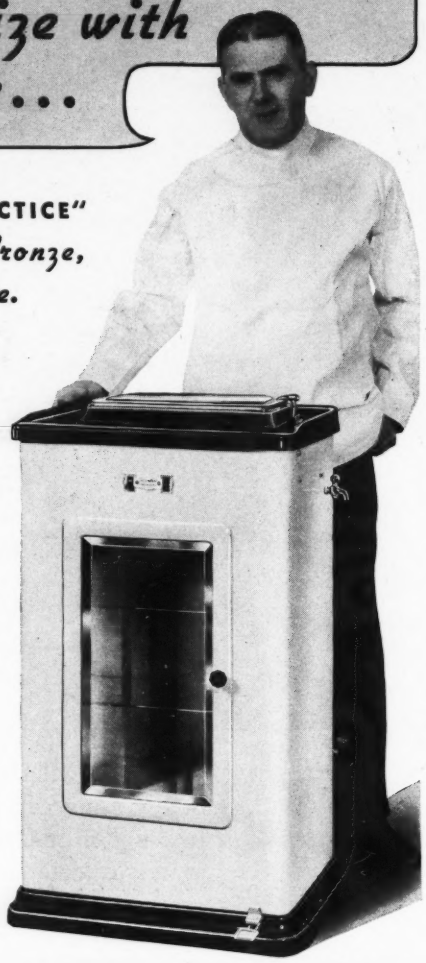

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THE DENTAL DIGEST

1005 Liberty Avenue Pittsburgh, Pa.

THE PUBLISHER'S NOTEBOOK

THIS month on pages 378 and 379 we are publishing another chart in the series, *The Education of the Dental Patient*, this time a double-page chart. Readers have told us that they have found the preceding charts extremely helpful and, naturally, we hope that the new chart will prove equally so. The Patient Chart idea is in keeping with the magazine's constant effort to save the dentist's time by speeding up the process of transferring information from authors' minds to readers' minds. The journal itself was planned to do that—to reduce essential information to minimum text through use of all possible illustrations. The charts have been an attempt to extend that plan, to save at least part of the time dentists must devote to interpreting to patients the nature of various conditions and the need for certain operative procedures.

As DENTAL DIGEST readers know only too well, it is often very difficult to make even the most intelligent patients comprehend dental truths when one must rely entirely upon verbal explanations. Many dental conditions are difficult to picture in words; they are much easier to explain when the verbal explanation is supplemented by graphic pictures, particularly when these illustrations are planned definitely for the layman's eye.

Moreover, a picture focuses attention upon the topic the dentist wants to talk about, tending to prevent the patient changing the subject, as so often happens in an informal conversation. Many dentists are placing DIGEST charts on their reception room tables, too, so as to make the most of every opportunity for fixing dental truths in patients' minds. Not only DIGEST charts but similar material from all sources may profitably be chosen for reception room reading, in place of the miscellaneous assortment of magazines so often found there. Personally I believe that the dental journals themselves should rarely be made available to patients. Professional magazines are addressed to the profession, not the patient. Patients are not educated to understand more than an occasional professional magazine article and there is danger of their reading just enough and understanding just enough to form distorted ideas of dental condi-

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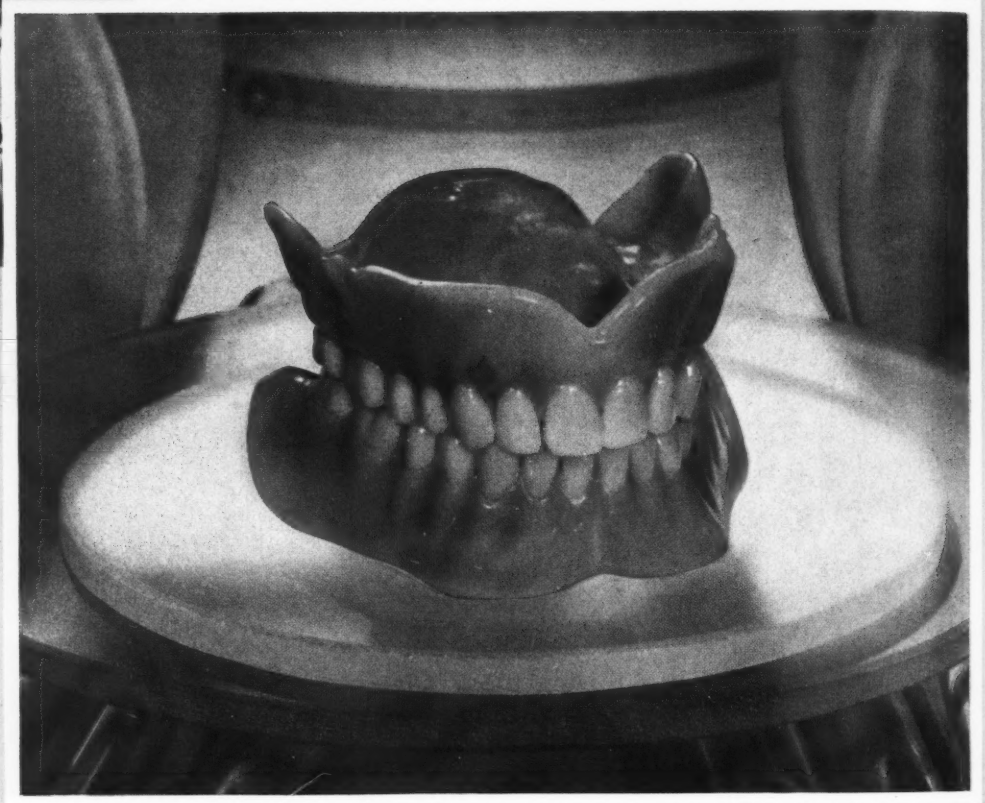

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tions and procedures.

Even certain issues of popular national magazines are not appropriate. In September *Oral Hygiene,* the author of "Redesigning Your Reception Room" stressed this, having been led to do so by discovering in one reception room a national periodical featuring an article about the maternal death rate and "the laxity of physicians in allowing such deplorable conditions to continue." The author asked whether "this is good propaganda in the office of a colleague who is likewise ministering to the public health as well as to its beauty." Another article cited was entitled "The Doctor's Bill" and championed state medicine. Professional men cannot prevent the circulation of articles like this, but it seems obviously inappropriate to select them for reception room reading.

Incidentally, speaking of reception room reading, the same author (a dentist's wife, by the way) has prepared another article for December *Oral Hygiene;* this new article deals with reception room lighting, a detail too often neglected despite the fact that bad lighting must be irritating to patients obliged to kill time while waiting their turns in the chair. Before writing this, the author made a comprehensive study of the subject, visiting various offices and accumulating as well authentic information about proper lighting. Her article will carry several carefully prepared illustrations, making it easy for readers to correct the faulty illumination of their reception rooms where they discover it to exist.

* * *

That dental practice is definitely on the upgrade seems indicated by an investigation recently conducted by J. J. Downes, business manager of THE DIGEST. To a list of 2,000 dentists selected at random from several states, using *Oral Hygiene's* list of the entire profession, he sent a questionnaire of which the first question asked was, "How did your practice for the first six months of 1936 compare with the last six months of 1935?" A total of 251 responded, a percentage regarded by statisticians as an adequate cross-section. Of these, 251 a total of 171, or 68 per cent, reported practice increases averaging 21.2 per cent; 43, or 17.2 per cent, reported no change; 37, or 14.7 per cent, reported practice decreases.

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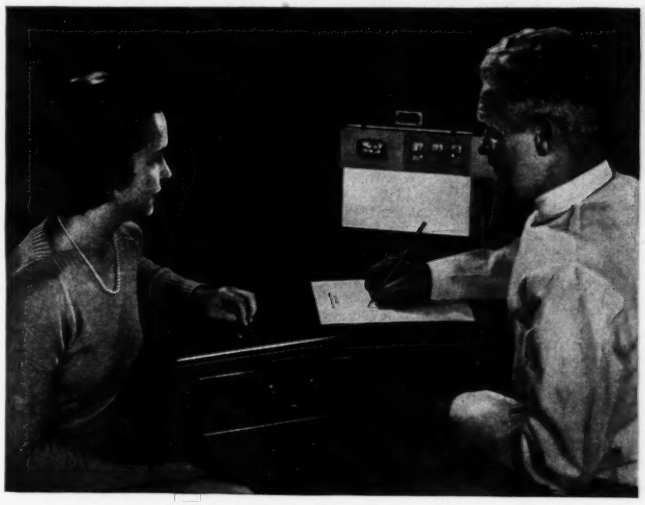
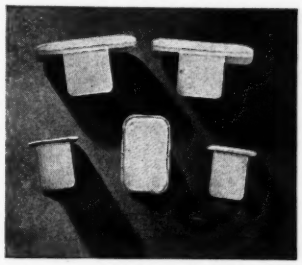


with Eastman Bite-Wing X-ray Films



The complete *Bite-Wing* examination is made with only 5 films costing but a few cents. Two Type 3 packets are used for the posteriors, three Type 1 for the anteriors. Progressive dentists make *Bite-Wing* examinations yearly at the time of the periodic prophylaxis.

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With *Bite-Wing* radiographs you can immediately advise the patient of all needed dental work to preserve tooth health... You can practice thorough preventive dentistry conveniently, efficiently, and inexpensively.

Special, Economical Films

Patented Eastman *Bite-Wing* Dental X-ray Films are of just the right sizes and shapes for convenient use in the various dental regions. The emulsions, on a safety base, have the correct sensitivity to record the coronal portions of the teeth and the alveolar tissue, with sharp contrast and fine detail. The bite-tab is of proper thickness to prevent overlapping of the cusp images. Eastman *Bite-Wing* Films are the only films made for proximal radiodontia.

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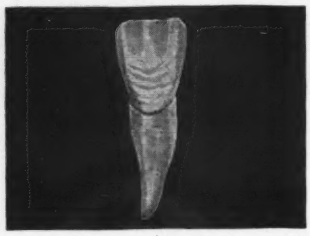
Dentists prefer the Lochhead Porcelain Jacket Crown



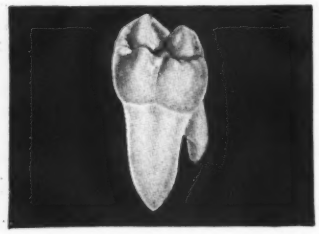
★ ★ ★

IT'S no wonder the Lochhead jacket crown continues to be so popular . . . no wonder doctors specify it for anteriors, for posteriors, and as abutments for the numerous variations of the Lochhead torque-resisting bridge.

For one thing, the Lochhead jacket crown is made of a dense, strong, high fusing porcelain which has all the natural translucency and all the crushing power of the natural tooth. And then, of course, it's not a jot different from the original once it has been carved, shaped, and stained to harmonize with the adjacent teeth.

That, no doubt, is why dentists continue to display such a decided preference for the porcelain jacket crown, as Lochhead makes it.

★ ★ ★



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CHICAGO, ILL. 5 East Washington St.	MONTREAL, CAN. 1414 Drummond St.

Averaging increases and decreases, the entire group's net practice increase was 16.2 per cent.

Mr. Downes asked also about collections, and 59.2 per cent were able to report improvement; 26.7 per cent reported no change; 13.9 per cent reported a decrease in collections.

Of the investigation Mr. Downes said, "The authoritative value of any statistical study depends to a great extent upon the method used in compiling the original data. The opinions of 251 dentists in the higher income brackets would be of little value as an index of the profession as a whole. Nor could the opinions and experiences of a group confined to one section of the country be accepted as representative. Thus, to provide a *typical sample,* the group must embrace a varied class of practices as well as liberal geographical distribution. While 251 dentists represent only a small percentage of the entire practicing profession, when such a group embraces practically every type of practice and is widely distributed geographically, it presents a typical sample. Thus, just as the metallurgist determines the metallurgical properties of an ingot by examining a small sample, we have selected a typical segment of the profession for the purpose of studying practice trends."

In surveys conducted by *Fortune* magazine, opinions obtained from .00006 per cent of the adult population are regarded as adequate "samples." This practice-trend investigation embraced a larger percentage, .0038 per cent of the 64,500 American practicing dentists.

* * *

We always dislike to write to readers that certain back numbers they want are out of print. But this occurs frequently and there is nothing we can do about it, beyond listing such requests in the order received, against the chance of our being able to obtain these issues from outside sources. Frequently new subscribers (and occasionally old subscribers who have allowed their subscriptions to lapse) ask that their subscriptions be dated back to include numbers carrying certain articles they are anxious to read and keep. Where possible this is done, but too often it is not possible. The only copies we have of many issues are those in our bound files here and in the editorial office.

—MERWIN B. MASSOL, *Publisher*

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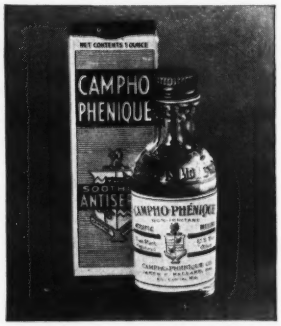

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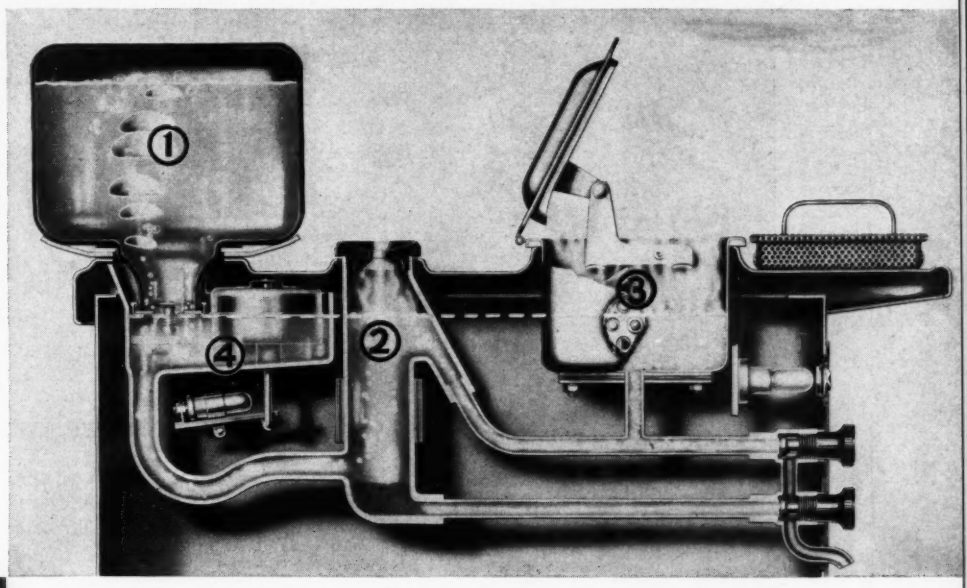

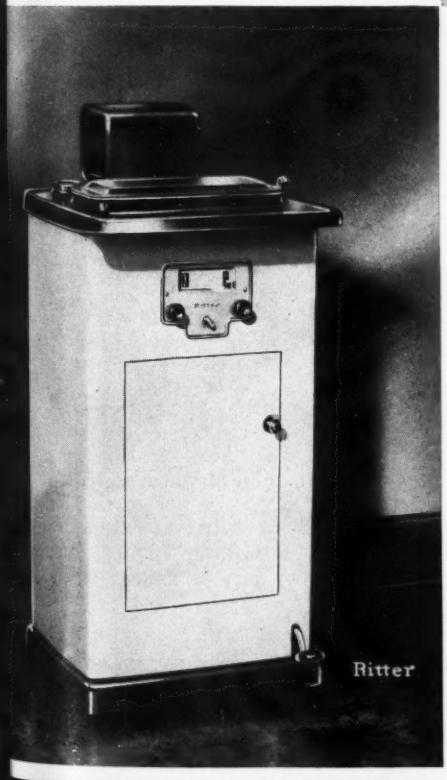

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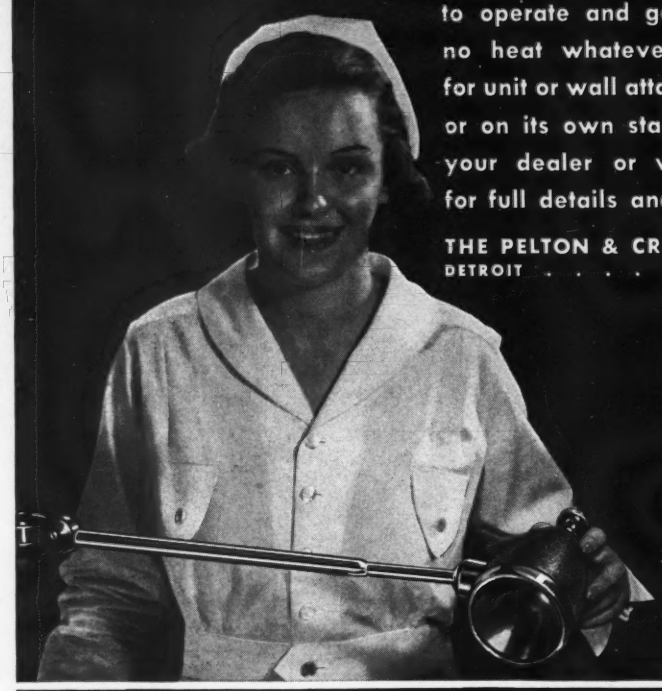

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CLINICAL COMMENT

Glass as a Denture Base
An Abstract

FRANK M. LOTT, D.D.S., B.Sc. described his use of GLASS AS A DENTURE BASE in a bulletin[1] issued by the Canadian Dental Research Foundation:

REASONS FOR DECISION TO EXPERIMENT WITH GLASS

Glass is a material known to have (1) hardness, (2) tenacity, (3) general stability, (4) wide color variation and color permanence, (5) and certain glasses could be sealed to porcelain and various metals.

REQUIREMENT OF AN IDEAL DENTURE BASE

The requirements of an ideal denture base, which the glass sought for this purpose would have to meet, are: (1) Color, including permanence of color and translucence; (2) strength; (3) stability, both physically and chemically; (4) density; (5) wetting ability; (6) welding ability; (7) hardness; (8) elasticity; (9) volumetric change; (10) weight; (11) thermal conductivity; (12) absence of odor or taste; (13) cost; (14) practical working properties.

DEVELOPMENT OF A SUITABLE GLASS

Because the physics or chemistry of glass is a complex and highly technical study in itself, in 1932 Doctor Lott turned the problem of finding the required glass over to the Research Department of one of the largest glass companies. The production of satisfactory melts was left to the company while Doctor Lott determined his requirements and tested the subsequent products from the dental standpoint. The chief difficulty as the technique improved was to eliminate cracking. After a great deal of experimentation, the problem of coloration arose. A choice was finally was made from the Munsell Color Atlas designated as R 4/6. This was satisfactorily approximated by the glass company with two glasses, Number 658 DQ and 658 DS.

DEVELOPMENT OF A SATISFACTORY TECHNIQUE

The development of a satisfactory technique was slow. More than one hundred experimental dentures were made. Sixty different glasses were tested; eight flask designs were con-

[1]Lott, F. M.: Glass As a Denture Base, Bulletin Number Twenty-Three, The Canadian Dental Research Foundation, July, 1936.

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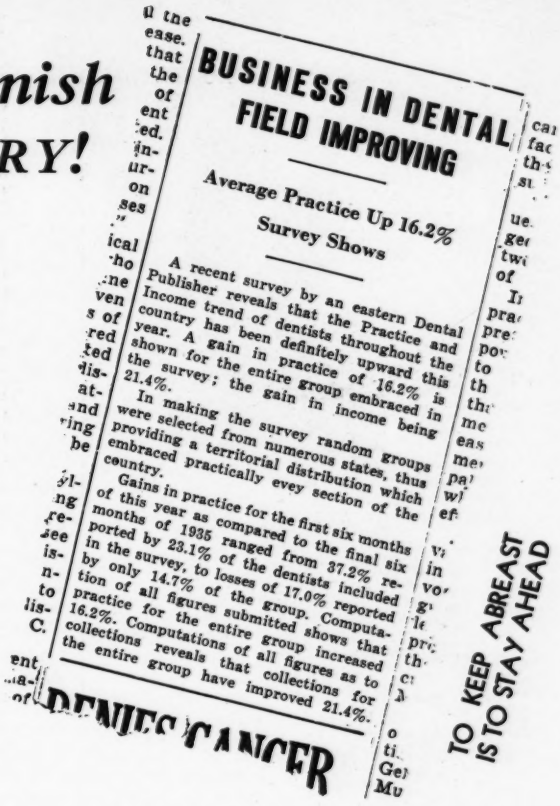
BUSINESS IN DENTAL FIELD IMPROVING
Average Practice Up 16.2%
Survey Shows
A recent survey by an eastern Dental Publisher reveals that the Practice and Income trend of dentists throughout the country has been definitely upward this year. A gain in practice of 16.2% is shown for the entire group embraced in the survey; the gain in income being 21.4%.
In making the survey random groups were selected from numerous states, thus providing a territorial distribution which embraced practically evey section of the country.
Gains in practice for the first six months of this year as compared to the final six months of 1935 ranged from 37.2% reported by 23.1% of the dentists included in the survey, to losses of 17.0% reported by only 14.7% of the group. Computation of all figures submitted shows that practice for the entire group increased 16.2%. Computations of all figures as to collections reveals that collections for the entire group have improved 21.4%.
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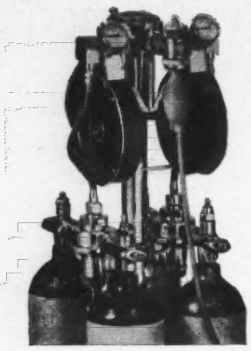

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structed; nine furnace designs were made; and more than a dozen variations of mold material were used.

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2. The waxing is completed as far as possible exactly as the finished denture will be required to be; however, the operator must not wax to excess and expect to trim to proper contour later as with other materials. Glass is so hard that the process of trimming is slow. Operators are therefore advised to regard the denture as they would an inlay pattern. Glass takes the fine lines of the mold perfectly. After processing, it is only necessary to clean the mold material from it with a nail brush. The acid dip will completely finish it. Trimming is scarcely necessary.

3. The waxed denture is removed from the cast and the latter from the articulator.

4. A duplicate cast is constructed in refractory mold material. An old tobacco can may be used for this purpose. Some plastic impression material is prepared a great deal thinner than for use in the mouth and the can filled with it.

5. The plastic impression material is chilled and the top removed from the can to expose the base of the cast. The cast is removed and the impression poured at once with a thick mix of refractory mold material.

6. The impression material is removed from the cast and the waxed-up denture is sealed on the cast.

7. The refractory cast and denture are embedded in a thick mix of mold material in the bottom section of the flask with the protection rim of the cast as even with the upper margin of the flask section as possible. Casts with anterior undercuts should be flasked in a more vertical position to reduce the effect of this undercut.

8. The mold material is allowed to set; the excess trimmed off between the protection rim and flask, and a separating medium is applied to the exposed mold material.

9. The middle section of the flask is fitted in position on the lower; the assemblage is filled with another stiff mix of mold material and the top placed in position.

10. The second mix is permitted to set, then the flask is placed in boiling

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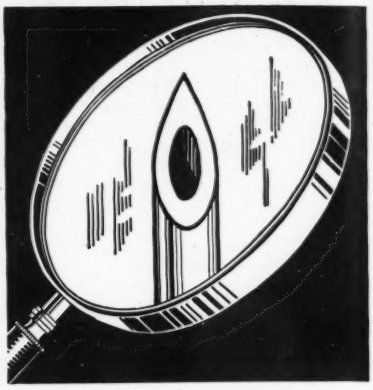

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THE SQUIBB PLAN ***by which most tooth decay can be prevented***

1. Go to your dentist and follow his advice. This will include the kind of toothbrush to use, and how to use it; what kind of dentifrice to use, and what kind not to use; and whether you should supplement your own home treatment with the use of dental floss and oral perborate.

2. Check your diet with your physician or dentist—to be sure your system is getting the elements essential to the health and strength of your teeth.

3. Brush your teeth thoroughly, at least twice a day, and be sure you use a dentifrice scientifically prepared to clean teeth effectively, and safely.

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water for a few minutes to soften the wax. The flask is opened and the wax removed.

11. A deep ditch is cut about the cast to take the excess glass during the pressing process.

12. The two halves of the mold are dehydrated over low heat.

13. From this point on, the top and middle section of the flask which contained mold material and teeth is designated as the female part. The remainder of the processing is done with this part downward. A cup-like depression is thus provided in which to soften the glass; at the same time the teeth are prevented from falling out of the mold.

14. The female section is packed carefully with pieces of glass cane cut to suitable length.

15. To determine the weight of glass to be used, weigh the teeth before articulating them in the set-up and weigh the completed set-up in wax. Deduct the weight of the teeth and multiply the result by four to find the weight of glass to be put in the mold.

16. The flask is assembled with the male part resting lightly on the surface of the packed glass in the female part.

17. The whole assemblage is placed in the cold furnace, covered, and the heat turned on.

18. When the glass is sufficiently fluid to begin pressing the denture, the vertical rod is placed down through the hole in the cover to rest on the top of the flask. The rod is marked to aid in determining the distance the flask closes when pressure is applied to it.

19. The horizontal lever is placed in position and a weight is suspended on it. The weight should not be too great because the pressure may deface the mold.

20. After about ten minutes, observe on the vertical rod the distance the flask has closed and, if necessary, open the furnace, remove the flask and examine it. When the flask is completely down, replace it in the furnace, put on the cover, turn off the heat, and allow the whole to cool down together.

21. When the flask is cold, it is opened and the denture and attached excess glass are carefully removed. The large pieces of mold material are removed from the denture with a pointed instrument, and the denture is cleaned with a nail brush and water.

"When a denture has been pressed fully down, the protection rim of the cast has thinned the junction of denture periphery and excess glass

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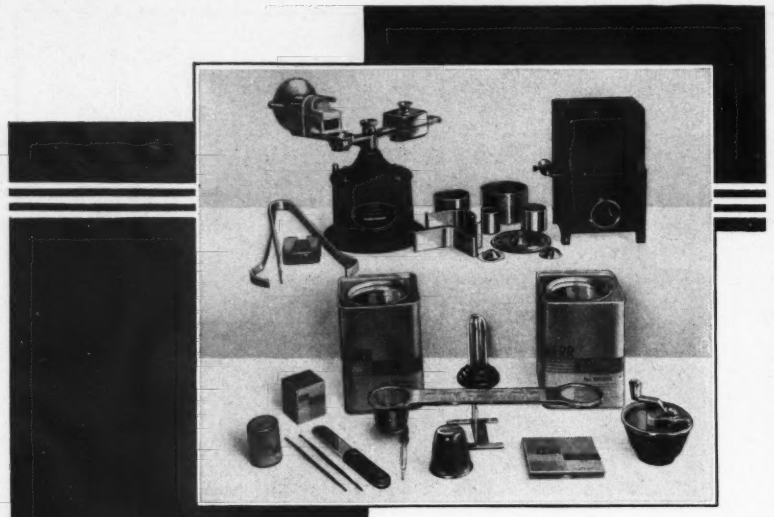

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in the waste ditch to a fine layer that can be broken all round with a wax spatula to free the piece or pieces of excess glass. If, on the other hand, it is necessary to cut through this roll of excess, a saw of sheet iron is probably the best agent." A slow speed apparatus has been devised for cutting and grinding glass. Another method is to use a dental stone at slow speed and with plenty of water or vaseline.

22. The ragged edge at the periphery is removed and the margin is ground to any desired shape by using a tapered, soft steel wheel provided in the apparatus.

23. The denture is dipped in acid solution after the teeth have been painted with a layer of hard inlay wax. The denture is then washed thoroughly. Polishing is done if necessary.

ADVANTAGES AND DISADVANTAGES[2]

1. The color available in the present denture glass satisfactorily matched the gum tissue in most cases; moreover, the color is stable; even remelting will not alter the color very much. The color will not be altered by light, moisture, drugs, salivary content, or food.

2. The denture is free from internal strain, which means that it will not be affected by heat, such as in sterilization.

3. Chemically there is no deterioration, so that the dealer need not worry about "shelf-life."

4. Glass dentures are translucent and, therefore, life-like, but the glass used has sufficient opacity to hide the necks of the teeth.

5. The strength of glass dentures has proved satisfactory *in the mouth.* Fracture from falling when out of the mouth is common, but probably no worse than other bases. Repair, however, is simple, and eventually shatter-proofing may be accomplished as is other glass products.

6. Thermal conductivity is high.

7. Welding ability is almost perfect, and for that reason relining of an ill-fitting denture is possible. Glass will weld in sections of any degree of thinness, so that junction lines do not show and the sections can certainly be joined.

8. In a hard, brittle material, such as glass, there is not the elasticity that other bases possess; its quality of strength compensates for this espe-

[2]Lott, F. M.: Advantages and Disadvantages of the Use of Glass as a Denture Base, J. A. D. A. 23:1915 (October) 1936.

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Used as a powder on the toothbrush, or as a paste for treatment of the gums, or as a solution for mouthwash and gargle, the nascent oxygen liberated by Vince finds its way where no liquid can reach. In a two per cent solution it is strongly antiseptic, yet it is pleasant, non-astringent and non-irritating. Trial supply on request. Vince Laboratories, Inc., 121 West 18th Street, New York City.

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A soft leather band, cushion padded, renders comfortable carriage when in use.

The complete equipment consists of ten feet of rubber covered wire cord, and a transformer, which operates on A. C. only. Additional cord can be furnished upon request. Furnished on ten days' trial—price —$15.50.

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cially as a base does not need to yield readily.

9. The glass denture is about one-fifth ounce heavier in an average case. Occasionally, this may be a disadvantage.

10. The denture takes an unusually high polish which is lasting.

11. Glass is impervious to bacteria.

12. A glass denture base is odorless and tasteless.

13. Working properties are completely desirable.

14. The technique involves few departures and these are not "critical."

15. Extra equipment is necessary. This consists of: a furnace with a nicochrome resistor and a flask of heat-resisting alloy. The cost is not prohibitive.

Conclusions

Doctor Lott asserts that here are many unsolved problems in the use of glass as a denture base. He believes it is not ideal but is full of promise.

Even since the publication[1] of the complete report on the use of glass as a denture base the technique and equipment which are described here in abridged form have undergone revision.

COD LIVER OIL STUDY

A FIVE year study has been reported[1] concerning the value of cod liver oil for reducing industrial absenteeism caused by colds and respiratory diseases. Because early studies among public school children in the East and Middle West indicated that the daily administration of cod liver oil tended to reduce the incidence and severity of colds and the consequent loss of time from school, the possibility that cod liver oil might have a similar effect on industrial workers seemed likely. An investigation was therefore instituted to test the value of cod liver oil.

Typical subjects were chosen for the study, men and women between

[1]Holmes, A. D. and Pigott, Madeline G.; Sawyer, W. A. and Comstock, Laura: Cod Liver Oil—A Five-Year Study of Its Value for Reducing Industrial Absenteeism Caused by Colds and Respiratory Diseases, Industrial Medicine, 5:439 (July) 1936.

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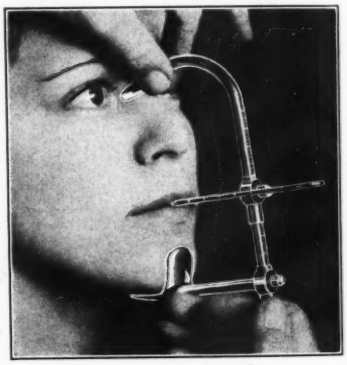

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the ages of 18 and 60 whose occupations and body weights varied sufficiently to give a general cross section of wage earners. The subjects were under observation for a 20-weeks period when colds and respiratory diseases are most prevalent, from November to April. An attempt was made to duplicate all conditions in selecting control subjects; however, those with frequent colds predominated in the cod liver oil group because they did not wish to be omitted from this group, and those who were relatively free from colds predominated in the control group because they did not wish to join the cod liver oil group.

It was recognized that the Vitamin A intake of a group would vary considerably and that the body stores are variable. It was, therefore, impossible to estimate what amount administered to a large group would produce uniform results.

For the purpose of the study one-half the subjects were given five tablespoons of cod liver oil per week during the daily rest periods. Daily records were made of whether the members of the cod liver oil and control groups were present or absent from work. The cause of absence was noted in each case.

The number of subjects that participated in the study in the five years was 3,031. There were 341, 566, 691, 648, and 785 subjects in the first, second, third, fourth, and fifth years respectively. About one-half served as controls.

In each of the five yearly tests the cod liver oil groups were absent considerably less time than the control groups. Moreover, in each of the five years the cod liver oil groups were absent less than during the corresponding period the previous year. This was not true for the control groups. The cod liver oil groups gave consistent results from year to year in showing less absenteeism as a result of colds and respiratory diseases than the control groups. The value of cod liver oil, therefore, in reducing industrial absenteeism caused by colds and respiratory diseases was definitely concluded by the investigators.

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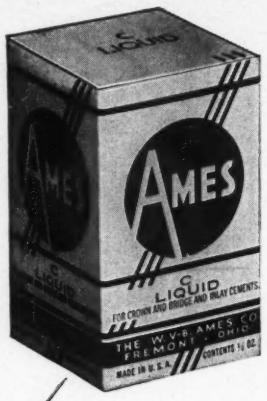

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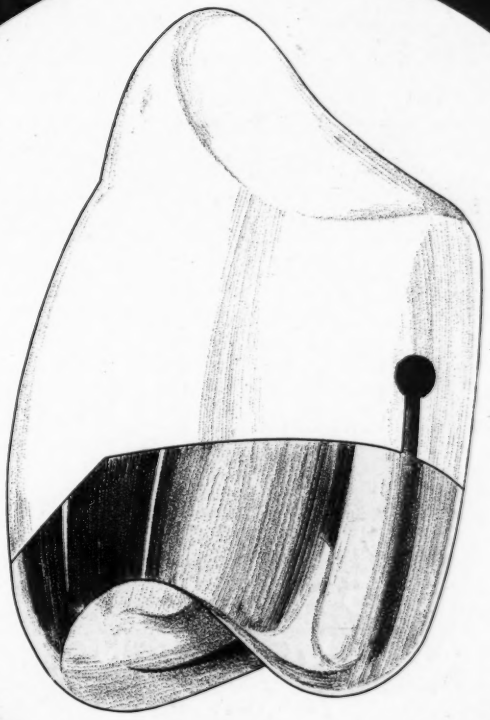

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